

Utah **STEM Action Center** Annual Report FY2017

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**STEM Action Center
Annual Report to the Education Interim Committee
October 10, 2017**

The following report is being submitted to the Education Interim Committee by the STEM Action Center. The report contains the following requested information:

- (1) The Board shall report the progress of the STEM Action Center, including the information described in Subsection (2), to the following groups once each year:
- (2) The report described in Subsection (1) shall include information that demonstrates the effectiveness of the program, including:
 - (a) the number of educators receiving high quality professional development;
 - (b) the number of students receiving services from the STEM Action Center;
 - (c) a list of the providers selected pursuant to this part;
 - (d) a report on the STEM Action Center's fulfillment of its duties described in Subsection 63M-1-3204; and
 - (e) student performance of students participating in a STEM Action Center program as collected in Subsection 63M-1-3204(4).

1. The number of educators receiving high quality professional development:

The STEM Action Center oversees two projects that support high quality professional development: (1) the professional learning (PL) grant program that combines a video-based and online platform, blended with supporting activities such as coaching, mentoring, self-reflection and the (2) elementary STEM endorsement.

K-12 Professional Learning program:
A total of 67 grants were funded, with 10,074 educators participating as a result of the awarded grants. There were 342 elementary educators enrolled in the first cohort of the STEM endorsement, with 330 completing the endorsement. A second cohort for the elementary endorsement program began summer of 2017 with 436 educators enrolled.

A minimum of 135 educators received professional development for Computer Science Discoveries, Advanced Placement Computer Science Principles, Computer Science Principles, Exploring Computer Science (a secondary course), and Computer Science in Science. There were 451 elementary teachers who participated in the Computer Science Fundamentals workshop. The funding for professional learning opportunities in computing was provided by the code.

org grant discussed later in this report and a corporate match.

Teachers and administrators from over 550 schools received professional learning for the use of the K-12 Math Personalized Learning tools as part of the contracts with the product providers.

2. The number of students receiving services from the STEM AC

The numbers of students that accessed resources from the STEM AC are as follows:

- Classroom grants: over 16,000
- K-12 math personalized learning program: 131,430
- STEMfest: more than 29,000 students have signed up for the Utah STEM Fest, which occurs October 3-4, 2017
- Organization grants: approximately 65,000
- Sponsorships: The STEM Action Center exhibited at 30 events statewide. There were 32 events who received financial support with sponsorships and 18 received in-kind sponsorships, thus impacting more than 143,000 students, parents, community and industry members.
- STEM Magic Show Assemblies: approximately 9,000
- STEM for Life: approximately 180

10,074

10,074 educators participated in K-12 Professional Learning Program

- Utah STEM Bus (USB): 3,281

3. A list of providers selected pursuant to this bill:

See Appendix A.

4. A report of the STEM AC fulfillment of its duties described in subsection 63M-1-3204

STEM Action Center (STEM AC) Staff and Roles (63M-1-3204; 1(a), (c)i)

The STEM Action Center (STEM AC) consists of the Executive Advisory Board, an Executive Director (Tami Goetz), Program Director (Sue Redington), Program Coordinator (Jackie Moynihan), Outreach and Engagement Specialists (Kellie Yates and Clarence Ames), an Administrative Assistant (Lolly Bowler) and a Marketing and Communication Specialist (Kaitlin Felsted). The STEM Action Center also works collaboratively with several other state agencies to support STEM education and workforce and economic development. These collaborations result in two additional shared staff members: the Utah Department of Workforce Services (DWS; Lynn Purdin) and the Governor's Office of Economic Development (GOED; Vatsala Kaul). Kellie Yates also serves as a liaison with the Utah State Board of Education (USBE). A part time Director for the newly formed STEM AC foundation was added this fiscal year (Allison Spencer), along with a new foundation board. The STEM AC received several grants that provided for staff to implement and oversee the grant

projects. Three new team members joined the STEM AC for the Utah STEM Bus (Charles Keeler, Bradley Hunsaker and Abby Dowd) and a part-time team member for the STEM for Life project (Yeganeh Lari). The STEM AC is fortunate to have a full time volunteer that helps with various projects, Ann Barnia.

In addition to full and part time staff, the STEM AC works with high school juniors and seniors, as well as undergraduates as STEM Ambassadors. The STEM Ambassadors help with events at the STEM tables, calling schools for STEM Fest, and building content on the STEM website. The ambassadors commit to serving a minimum of 20 hours each year and upon completion of their "ambassadorship" they receive a certificate and award. There were 18 STEM Ambassadors for FY17, 80% more than last year.

The STEM AC reports to the STEM Action Center Board, with its membership and duties defined by statute. This model has worked well, with the Board providing tremendous financial and in-kind support. The ability of the Board to have a strong role in the direction of the STEM AC has led to considerable buy in from industry and the USBE. The Board has strong representation from industry, public and higher education as well as various state agencies. Industry board members have included Orbital ATK, Goldman Sachs and Adobe, Nelson Labs. New board members have now joined, representing Dell EMC, Oracle, BAE Systems, Chevron and Intermountain Healthcare.

Private entity engagement (63M-1-3204; 1(d); 2 (e))

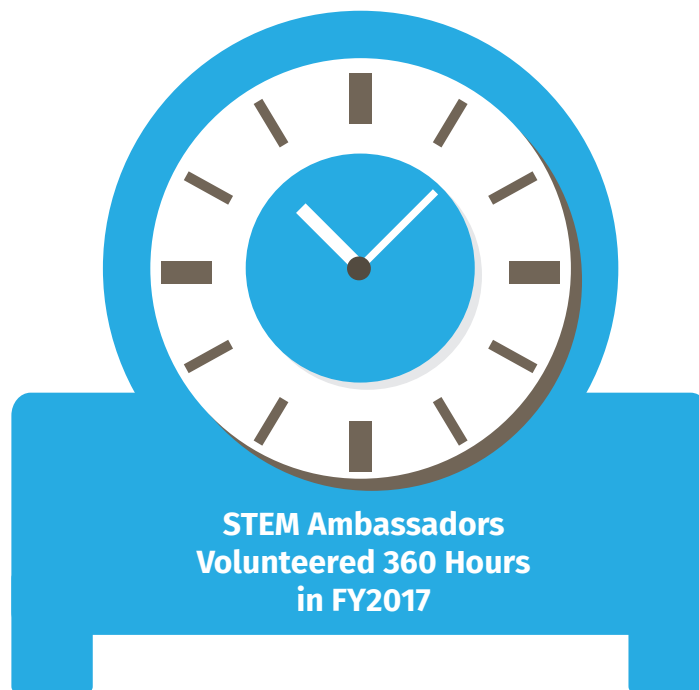
Private entity support has been a strong component of the STEM AC, with contributions being provided in a variety of ways including cash donations, grants and sponsorships, program collaborations and in kind contributions. The Utah STEM Foundation became official this year, having received the Letter of Determination from the Internal Revenue Service on May 10, 2017. The STEM AC worked with bill sponsors Representative Val Peterson and Senator Brian Shiozawa to amend the legislation to allow for the creation of an endowment within the Foundation. The Foundation has an advisory board with industry support from Andeavor (formerly Tesoro), Boeing, Comcast, Goldman Sachs, Intermountain Medical Group, LSI, MHTN Architects, Microsoft and US Synthetic. A part time director who oversees the function and activities of the Board, as well as the receipt of all donations from corporate partners.

Cash Donations for fiscal year 2017: The following companies generously provided cash donations: Adobe-\$50,000; Andeavor-\$300,000; Boeing-\$17,500; Comcast-\$30,000; Hill Air Force Base-\$250,000; IM Flash-\$44,207; Miller Family Philanthropy-\$50,000;

Rockwell Collins-\$2,000.

In Kind Contributions for fiscal year 2017: The following companies generously provided in kind contributions: Orbital ATK: over 500 computers; MHTN: Pro Bono Architectural services for the Utah STEM Bus; VCBO: Architectural mentoring for PCCAPS students; UTA: 2 Transit Buses and a Transit Van for Utah STEM Action Center programs; Brackitz: Education Kits; SumBlox Group: SumBlox kits; Midwest Commercial Interiors: Furniture and carts for the Utah STEM Bus;

Grant Funding: The following new grants were secured during the fiscal year 2017: Hill Air Force Base: \$15,000 for computing perception studies, \$30,000 professional training for teachers in code.org activities and \$20,000 for Utah STEM Bus school grants.



Sponsored events:

The majority of the following programs were (1) supported by private entities, through cash or in kind contributions or (2) engaged with private entities.

STEM SCHOOL ASSEMBLY

The STEM AC has received numerous requests for STEM activities for school assemblies. A number of options were explored as a sustainable approach to student engagement. The STEM AC launched the STEM School Assembly program fiscal year 2016, in partnership with a local magician Paul Brewer and with the support of funding from CenturyLink. Paul Brewer worked with the STEM AC team to create an innovative version of a magic show that incorporates STEM themes with a high tech format for delivery. CenturyLink provided the first year of support for the program (\$10,000), which allowed for 14 visits to schools. The program reached 9 school districts from Ogden to Tintic, impacting more than 9,000 students.

NORTHERN UTAH STEM EXPO

The STEM AC has committed to supporting regional STEM outreach and engagement opportunities. The Davis, Weber, Ogden and Morgan school districts hosted the Northern Utah STEM College and Career Exposition on November 7, 2016 at the Davis Conference Center. The event was divided into two sessions; a high school session and a community STEM Family Night. 900 high school students, 60 teachers, 16 companies presenting, and 60 companies participating as exhibitors attended during our high school session. A Family STEM Exposition ran from

5:00 – 9:00 PM and was open to parents, junior high students and elementary students of Davis, Weber, Morgan and Ogden school districts. There were approximately 6,000 in attendance. The STEM Action Center sponsored this event at \$15,000 and helped to promote it to the public.

UTAH LIFE SCIENCE SUMMIT

It is critical for the STEM AC to partner with Utah industry trade organizations. They are an essential link to Utah companies and have been very supportive of the STEM AC since its inception. They help to promote STEM education in Utah through various collaborative events. BioUtah hosts an annual Utah Life Science Summit at the Hilton Salt Lake City Center at which they have an awards ceremony luncheon for those dedicated to the life sciences industry. This year's event was held on October 6, 2016. The STEM Action Center sponsored the recognition of six high school students at this event for their efforts in STEM related subjects. Sponsorship included trophies, two tables at the front, and logo recognition. More than 350 people attended the event from industry, government, and higher education. The STEM Action Center sponsored this event at \$1,500.

UTAH SCHOOL COUNSELOR ASSOCIATION CONFERENCE

The STEM AC believes that it is important to support counselors; they are the bridge for bringing information about STEM career opportunities to students and parents. Sponsorship of the counselor conference is one way that the STEM AC works to help school counselors. The Utah School Counselor

Association Conference is an annual conference; this year's event took place on October 6-7, 2016 at the Jordan Academy for Technology and Careers for Utah School Counselors. The Utah STEM Action Center used this event as a way to promote STEM resources to counselors. More than 450 attendees from industry and education were at the event. The STEM Action Center sponsored this event at \$1,000.

CRAFT LAKE CITY/ENGINEERING BUILDING

The STEM AC is committed to supporting STEM education and believes that the arts and humanities are critical to supporting the creativity that elevates STEM. Craft Lake City, held at the Gallivan Center from August 12-14, 2016, hosted an Engineering STEM Building where the STEM Action Center interacted with students, parents and industry for two days. There were over 30,000 in attendance at the event. The STEM Action Center sponsored this event at \$1,500.

SOUTHERN UTAH STEAM FESTIVAL

Again, the STEM AC searches out opportunities to support cross-disciplinary events for students to explore the creative side with STEAM. The Southern Utah University Center for STEM Teaching and Learning, the Orchestra of Southern Utah, Cedar City Library in the Park, Iron County School District, and Southern Utah Sustainable Operations Partnership collaborated to plan a two-day STEAM festival in early 2016. They invited STEM organizations, art organizations, and businesses from across the state to set up booths on Southern Utah University's campus for

two days of hands on learning from October 28-29, 2016. There were over 2,200 attendees from the community. The STEM Action Center sponsored this event at \$5,000.

SHETECH

SheTech is one of the more recent partnerships with a trade organization. This event represents the STEM AC's commitment to reaching out to girls to encourage and support them in pursuing STEM interests and careers. SheTech Explorer Day is a conference for high school girls in 9th through 12th grade. There were over 1,200 girls that attended this event at Utah Valley University's UCCU Center on March 3, 2017. Students interacted with different companies that have technology at their core to see if it is a right fit for them. This day-long event included hands on activities in science, technology, engineering and math (STEM). Weber State University also held a SheTech Day on March 11 impacting an additional 500 girls. The STEM Action Center sponsored these events at \$5,000 total.

STAND BESIDE HER MENTOR LUNCHEON

This luncheon is one of the Girl Scouts of Utah's signature events. The STEM AC works with the Girl Scouts of Utah to encourage girls to consider STEM careers. On March 14, 2017, at the Hilton Salt Lake Center, more than 300 business, civic, and community leaders came together to celebrate female leadership and honor individuals and corporations who are making positive changes in our communities. Great emphasis was placed on STEM, with several girls having the opportunity

OTHER SPONSORED EVENTS

(note that not all included industry sponsorship)

Event		Number impacted (approx)	Event Location	Event Date
STEM Fun Run	\$500	500	Salt Lake Center for Science Education	8/28/16
Governor's Medals for Science and Technology	\$1,000	300	This is the Place Heritage Park	1/19/17
Utah Teachers Association	\$200	600	Utah Valley Conference Center	2/10/17
Bridgerland Applied Technology College (BATC)	\$500	4,000	BATC	5/3-4/17
Super Science and Math Night	\$500	500	Windridge Elementary School	3/3/17
Wizarding Dayz	\$1,000	5,000	South Towne Expo Center	2/24-25/17
Utah Engineers Council	\$2,500	200	Rio Tinto Stadium	2/17/17
HacktheU	\$1,500	181	University of Utah	11/11/16
Elementary Family Engineering Night	\$500	470	Thunder Ridge Elementary	10/27/16
Multicultural Youth Leadership Summit	\$100	1,700	Salt Palace Convention Center	10/3/16
Mountainland Code Camp	\$1,500	100	Xactware Solutions	3/10/17
Jump Start	\$1,000	608	Ogden Conference Center	10/8/16
Utah Regional FIRST Robotics Competition	\$1,250	250	Hillcrest High School	1/6/17
Utah STEM Envirothon Competition	\$1,500	350	Richfield High School	4/20/17
Mountainville Academy STEM Night	\$500	380	Mountainville Academy	3/22/17
Northern Utah Rube Goldberg Competition	\$1,250	300	Weber State University	10/25/17
Salt Lake City Mini Maker Faire	\$500	2,000	Utah Fair Grounds	4/15/17
PhysX	\$500	50	Utah State University	5/12/17
PTA Conference	\$115	500	Murray High School	6/8-9/17
High School Utah Entrepreneur Challenge	\$1,000	100	University of Utah	5/14/17
Comicon	\$0	50,000	Salt Palace Convention Center	03/17/17-03/18/17
STEAMed Up	\$0	500	Salt Lake City Library	11/19/16
Kids Day with the Stars	\$0	1005	Salt Lake Community College	02/08/17
Utah Council of Teachers of Mathematics Conference	\$0	300	West High School	11/04/16
Expanding Your Horizon	\$0	380	Utah Valley Convention Center	01/07/17
Northwest Middle School Career Fair	\$0	200	North West Middle School	01/19/17
DATC Career Days	\$0	1,200	Davis Applied Technology College	05/05/17
Kearns Junior High STEM Night	\$0	300	Kearns Junior High School	03/18/17
Willow Park Zoo: Dream Rocket Project	\$0	1,500	Willow Park Zoo	04/22/17
Economic Summit	\$0	900	Grand American Hotel	04/14/17
Summer Reading Program Kick Off	\$0	5,000	Viridian Center	06/02/17
Pathways to Professions	\$0	9,000	South Towne Expo Center	10/12/17-10/13/17

to be mentored by STEM leaders. The STEM Action Center sponsored this event at \$2,500.

UTAH PUBLIC ASSOCIATION OF CHARTER SCHOOLS

The STEM AC has spent the last year engaging with school boards and parent associations. Charter schools are an important stakeholder group and the STEM AC strives to engage with them to understand the needs of their students. Utah's largest gathering of charter school leaders and educators, approximately 600, came together on Oct. 6-7, 2016 at the Jordan Applied Technology Center. The STEM Action Center had a booth and the opportunity to network during meals and work on future collaborations with the Charter Schools to increase STEM awareness. The STEM Action Center sponsored this event at \$1,000.

JATC AND SLCC BIOTECHNOLOGY SYMPOSIUM

The STEM AC supports a number of science fair events, both regional and statewide. Biotechnology students from Jordan and Canyon's School Districts, and from the Salt Lake Community College, participated in inquiry based hands on independent projects in state-of-the-art biotechnology facilities. These projects were displayed on May 19, 2017 at the annual Biotechnology symposium in the Health Sciences Building at the Salt Lake Community College. Students described their research to academic and industry professionals that judged the posters in a number of categories. They invited local biotech companies and gave them the opportunity to set up tables to share career information with

students. There were over 100 students impacted and the STEM Action Center sponsored this event at \$1,000.

BEEHIVE SCIENCE AND ENGINEERING ACADEMY STEM EXPO

This expo represents a regional outreach and engagement event that serves both the Beehive Academy students and students from bordering districts. Utah STEM Expo was attended by students in 6th through 12th grade showcasing their projects and demonstrations. There were projects from science, math, engineering and computer science performed by students from Beehive Academy and other schools. The event took place on January 21, 2017 with more than 4,500 students impacted. The STEM Action Center sponsored this event at \$2,500.

UTAH STEM FEST

The STEM AC partnered with Utah's Industry to begin planning the third statewide STEM Fest, which will take place October 3-4, 2017, at the South Towne Expo Center. So far more than 85 sponsors from industry, government and higher education are confirmed to exhibit and nearly 30,000 students are registered to attend. This event is sponsored almost entirely from corporate donations. A summary of this event will be included in the annual report for FY2018.

STEM INNOVATION AWARDS

This sponsorship represents another way in which the STEM AC partners with trade organizations to promote and recognize accomplishment for students, teachers, counselors, administrators and mentors in STEM education. The STEM

Action Center held the second STEM Innovation Awards in partnership with Utah Technology Council at their annual Utah Innovation Awards luncheon on April 20, 2017. There were more than 400 industry leaders in attendance at the award luncheon.

The STEM Innovation Awards are an opportunity to recognize a student, teacher, counselor, principal and mentor in Utah who excel in science, technology, engineering and math (STEM). Nominations were open to the general public from February to March 2017. The STEM Action Center team and the STEM Action Center Board, through a rigorous process, selected this year's honorees.

Kathy Liu, student at West High School
Dawn McNiel, 5th grade teacher at Mountainville Academy

John Donley, CTE Coordinator and principal/administrator for Weber School District

Jill Wood, Day Camp Director with the YMCA of Northern Utah

Mark Jones, Counselor at West Jordan Middle School

STEM BEST PRACTICES CONFERENCE

The STEM Action Center held the third annual STEM Best Practices Conference on June 20, 2017 from 7:30 a.m. to 4 p.m. at the Utah Valley Convention Center.

The conference was an opportunity to learn about STEM Best Practices from Utah community experts and leaders in the K-12 STEM community. There were more than 600 registrants from school districts statewide. Several partners

supported panel presentations including Brigham Young University, Carnegie Mellon, Utah Education Network, Layton Construction, Thanksgiving Point, Clark Planetarium, Hawk Watch International, The Leonardo, the Department of Heritage and Arts, Utah Film Center, Future in Design, Cache Makers, Cotopaxi, Discovery Gateway, Loveland Living Planet Aquarium, Hogle Zoo, Natural History Museum, and the Clark Planetarium. Various other partners exhibited including ArduSat, Carnegie Mellon, IKOS, Imagine Learning, Intermountain Literacy, Salt Lake County Library System, Infini D Learning, Intermountain Literacy, McGraw Hill Education, MIND Research Institute, Salt Lake County Library System,

The following feedback was provided by participants about STEM Best Practices:

"I loved the more centralized location. It was great to not have to drive through SLC to get to the conference. The conference was very organized. It was fun to hear from schools that have implemented STEM. Thanks for holding the conference!"

"Liked having the raffle. Liked the video at the beginning before the Keynote."

"I enjoyed the conference, particularly the keynote address. I like the strands for the sessions and found the conference to be, overall, very beneficial. Thank you!"

"Wonderful conference -- thanks for all your hard work to make it a terrific experience for all."

"Super cool! Best 1 day conference ever."

"GREAT conference! Loved the door prizes, good food, great presenters. Overall, a wonderful day!"

SumBlox Group, School Improvement Network and the Utah Governor's Office of Economic Development.

There were a total of five sessions throughout the day. The sessions included five different breakout strands for student engagement, leadership/mentoring, hands-on learning, cross-curricular connections and technology integration.

Session strands focused on the following:

- Student Engagement: Sessions will focus on specific strategies used by teachers to engage students more fully in a STEM class and culture.
- Leadership/Mentoring: Sessions will provide insight and guidance to school leadership on specific leadership skills and opportunities to apply a STEM focus to a school.
- Hands-On Learning: Sessions will demonstrate opportunities for hands-on learning focused on STEM that go beyond the typical projects.
- Cross-Curricular Connections: Sessions will demonstrate examples of STEM supporting other subject areas.
- Technology Integration: Sessions focus on appropriate technology integration, do's and don'ts, and tools available to teachers to use technology in their classrooms.

In conjunction with the Best Practices Conference, Utah STEM Designated Schools were awarded at the event. The

2015-2016 Schools were recognized in the morning and in the afternoon the 2016-2017 schools were recognized in a formalized event hosted by Stan Lockhart, STEM Evangelist, and Angie Stallings, Deputy Superintendent for the Utah State Board of Education.

UTAH JAZZ AND CENTURYLINK STEM STUDENT RECOGNITION

This partnership represents an opportunity to recognize student achievement in STEM. The Utah Jazz, in partnership with CenturyLink and the STEM AC, presented six awards to outstanding STEM students during the 2016-2017 basketball season. The students were nominated by a teacher and selected by the STEM AC staff to receive a customized Jazz jersey during half time at a Jazz game. The following students were recognized:

November 2016:

Sadie Boyer

North Summit High School- 12th grade

December 2016:

Anna Mancera

Salt Lake Center for Science Education- 12th grade

January 2017:

Hayden Stowell

Vanguard Academy- 9th grade

February 2017:

Grace Adams

Itineris High School- 10th grade

March 2017:

Isaac Wright

Mapleton Elementary- 6th grade

April 2017:

Cassandra Ivie

Copper Hills High School- 11th grade

CenturyLink donated \$10,000 to the STEM AC during half time at the last game of the season. This donation supported the STEM Magic Show Assemblies program, discussed previously under the STEM assembly section.

UTAH STEM BUS (USB)

The Utah STEM Bus (USB) is a mobile STEM classroom that is bringing exciting STEM activities and resources to all students in Utah. The outcomes for the USB include increased student engagement and enthusiasm for STEM activities, increased teacher awareness and industry investment in STEM. The USB currently uses STEM curriculum activities that have been used by other STEM buses (e.g., the Geek Bus) and can be aligned to the standards in core discipline areas. The long term plan for curriculum material and project design is to showcase local companies, technologies and innovations, that are aligned to the state core standards

The STEM AC received a grant for \$1.5M in 2016 from Andeavor (formerly Tesoro) to fund the design, purchase, retrofitting, and operation of a mobile classroom. The Utah Transit Authority (UTA) has donated two, 40-foot buses and a ten person van to the STEM AC. The first bus has been completed and had its inaugural debut on August 16, 2017 at the Utah Capitol, with Governor Herbert doing the honor of cutting the ribbon.

The USB has been piloting the curriculum materials and activities over the summer of 2017 to ensure a smooth deployment once the bus was completed.

The current curriculum includes:

- Robotics (grades 4-12)
- 3D Modeling (grades K-3 and 4-12)
- Engineering (grades K-3)
- Spatial Math (grades K-3)
- Renewable Energy (grades 4-12)
- Computer Programming (grades 4-12)
- Video Game Design (grades 4-12)

Additional courses are being developed in the areas of:

Texas Instruments Nspire Programming (grades 7-12)

Robotics (grades K-3)

The USB team, during the pilot period

Utah STEM Bus

3,281

From December 2016 through May 2017 the USB pilot program taught in 19 schools within 9 Utah counties and had direct teaching experiences with 3,281 K-12 students.

of December 2016 - June 2017, taught in 19 schools within nine Utah counties and had direct teaching experiences with 3,281 K-12 students.

The USB team, since the completion of the bus, has taught at additional schools and appeared at a variety of public and private events:

Utah School for the Deaf and Blind (20)

3 campuses of Bright Horizons

Preschool (80)

Weber Youth Corrections in Roy (10)

STEM Best Practices (130)

Adobe Family Day (600)

Andeavor Employee Event (100)

Draper Days Parade (12,000)

Ogden Pioneer Days Parade (16,000)

Hurricane Peach Days Parade (4,000)

Millard County Fair (400)

STEM MENTOR EXCHANGE (STEM MX)

The STEM AC has also been working with industry (specifically Comcast, Dell EMC, Adobe and Boeing) to build a mobile app called STEM Mentor Exchange (STEM MX). The STEM MX app is modeled after the matching services that exist in the public domain that utilize a profile-based submission platform. An algorithm then takes the profiles for “need” and matches them to the profiles submitted for “supply” and determines the best matches based upon keywords and phrases. This mobile app gives educators, counselors and parents an effective and easy way to connect to industry mentors and resources in the STEM community. Educators will be able to access industry mentors for help with STEM-related projects (e.g. helping to teach a difficult STEM subject in the classroom, soliciting industry

participation in STEM events, fairs and competitions, etc.). Counselors will have the ability to submit a profile that describes certain careers and STEM areas in which they are deficient in their knowledge and find an industry mentor to educate them. Parents will be able to submit a profile that can help them find resources such as summer camps, scholarships or STEM-related programs or events.

This platform solves the problem of exhausting or overtaxing industry partners. It allows for an industry mentor to toggle between active and inactive for their profile depending upon their current or projected workload. It is anticipated that this control over volunteering will be attractive to industry partners and encourage participation. This match-based platform also facilitates a more targeted approach to finding information. An issue that arises with keyword or phrase searches in a traditional website is that you only get information based upon what you know about the topic. A profile-based option allows for a user to be completely lacking in content knowledge in an area and still find useful resources and mentors.

STEM Mentor Exchange recently launched and has over 500 teacher profiles submitted. The STEM AC will put it to use for numerous efforts such as the K-16 Computing Partnership program. A STEM Substitute Teacher program is being explored to launch in the 2018-19 school year.

R&D role of STEM AC (63M-1-

3204; 2 (a)- (c); (f))

The ability to work closely with LEAs, the Utah State Board of Education (USBE), companies, informal education partners and other state agencies in exploring new and innovative ways to support students and teachers is what makes the STEM AC unique. This unique role, along with the data that is generated by the third party evaluation team, has resulted in strong support from the industry and LEA partners.

The STEM AC continues to integrate third party evaluation for many of its projects, including the K-12 Math Personalized Learning program, the K-12 Professional Learning grant program and the Elementary STEM Endorsement. The STEM AC had previously contracted with Utah State University (USU) but determined over time that it needed an evaluator with greater depth and breadth in educational evaluation experience. Further, it became clear that the evaluation process was vulnerable to turn over if the contract was with a single institution. The contract with USU ended December 30, 2016 and the STEM AC worked with the State Procurement Office to issue a Request for Proposals. A new contract was executed with a partnership between the Utah Education Policy Center at the University of Utah and the College of Education at Utah Valley University. The collaboration between the two universities brings greater experience, a larger team and increased access to data. An additional R&D function was added to the K-12 Math Personalized Learning program this past year. The STEM AC worked with the State Procurement

Office to create a process whereby new math personalized learning programs designed for K-12 students can be piloted in Utah schools. Product providers who wish to participate must meet all of the requirements of the original RFP, be approved by a review team, and demonstrate that they are willing and able to provide licenses at no cost to a minimum of 1,000 Utah students for one full school year. Providers are responsible for finding schools that are willing to pilot their product. If they meet all of the requirements, the impacts of their program will be evaluated by the STEM AC's third party evaluation team. Outcomes from new products will be compared to products currently under contract. If the performance of students using a new product meets or exceeds the average performance of students using other personalized learning products, that product will be added to an approved vendor list.

The projects for which there is an emphasis on third party evaluation and assessment include (1) implementation and outcomes of math tools in K-12 classrooms (2) implementation of high quality professional learning that integrates video-based, online professional development tools and materials with face to face professional learning (3) design and implementation of an elementary STEM endorsement.

The parameters of the evaluation (such as metrics and data that is to be collected) are defined by the requirements of the STEM AC's statute, and recommendations by the third party evaluator, the Utah State Board

of Education, and LEA partners. The STEM AC is working to focus on several areas of assessment include longitudinal data that shows that increased, and ongoing, access to STEM activities can make a difference in student choices and success in STEM. The STEM AC is working with Qualtrics on several specific perception studies including attitudes and behavior pertaining to computing education and careers and overall perceptions of STEM. The STEM AC will also focus the next year on evaluating employment and job trends in STEM. The goal is to determine if companies are finding talent easier, or finding employees that are better prepared to succeed in their companies, thus resulting in higher retention. It is likely that the overall numbers of open STEM-related jobs will not have decreased perceptibly due to the continued growth in jobs.

The STEM AC also works with LEAs to design, implement and oversee grant programs in key areas of STEM education and talent development. Grant programs include the recently initiated K-16 Computing Partnership and the micro grant programs (classroom and organization grants). The STEM AC will focus on improving the assessment of the classroom grants which will address one of the findings in the legislative audit conducted in FY17 (see below). The Utah STEM Bus has also been working to create surveys and other qualitative assessments to determine if access and exposure to hands on engaging STEM activities increases student interest in STEM.

The STEM AC has been working with

Qualtrics to build out an ongoing survey project to begin to look at stakeholder perceptions regarding STEM education and careers. There has been national data collected regarding interest in STEM, but the STEM AC is establishing the ability to monitor strategically responses to programs and marketing and communications efforts.

Review and acquire STEM education related technology 63M-1-3204 2 (c)

A core function of the STEM AC is the review and evaluation of STEM education-related materials and products. This makes the role of the STEM AC unique, and highly synergistic with the USBE. The STEM AC works closely with the State Division of Purchasing office to comply with all required procedures for the solicitation, review and contracting of product providers. The STEM AC works diligently to bring in subject matter experts (from LEAs and the Utah State Board of Education) to review the quality and appropriateness of educational tools.

The STEM AC is entering the fourth full year of the K-12 Math Personalized Learning tools project (school year 2017-18) and has completed the solicitation and procurement of products for Year 4. There were several challenges faced with this process, but the State Division of Purchasing team has been very willing to work with the STEM AC to explore solutions. The Office of Legislative Audit and Research (OLAG) completed a recent audit of the STEM AC and found that the Center has followed state procurement

guidelines effectively.

The STEM AC has created a new mechanism that will allow for ongoing R&D on new educational technology program in K-12 math. This mechanism was described in detail in the “R&D Role of STEM AC” section..

The new K-16 Computing Partnership will provide additional opportunities to review resources that support coding and other areas of computing. There are numerous resources, many of which are free, that the STEM AC will work with LEA partners to review and vet. The STEM AC received a grant with code.org that supports K-12 professional learning for coding and computer science classes. Further, the STEM AC received a grant from Carnegie Mellon University that supports the creation of a satellite for their CREATE Labs. The CREATE Labs projects provides support training and acquirement of supplies for cross-disciplinary robotics projects. One example is Arts and Bots, which is a robotics platform that can be used in many areas of study including biology, English and Language Arts, History, Math and Physical Education.

Use resources to bring the latest STEM education learning tools into the classroom

63M-1-3204 2 (f)

The STEM AC works closely with education partners to identify new STEM education learning tools. The annual STEM Best Practices conference has the main goal of bringing together Utah STEM (and non-STEM) teachers

to showcase the latest learning tools in the classroom. This provides an opportunity to share ideas and promote the use of the latest in STEM resources. The focus on bringing collaborative grants (e.g., the Carnegie Mellon University, code.org and STEM Equity Pipeline grants) increases the STEM ACs ability to bring new and innovative tools to Utah classrooms at no cost.

Again, the new mechanism that was recently launched for the K-12 Math Personalized Learning program is a good example of how the STEM AC works to identify and assess the best resources for math instruction.

The following grant programs help to support STEM education learning tools in the classroom:

(1) The STEM AC provides classroom grants to teachers that provide funding to support the design and implementation of new STEM activities in the classroom. This grant program is discussed in detail in following sections. (2) The new K-16 Computing Partnership grant program provides numerous best practices in K-12 computing education. Grant applicants can apply for funding to access these resources (e.g., the Carnegie Mellon University STEAM programs, code.org professional learning workshops and STEM Equity Pipeline resources for micro-messaging and root cause analysis). These resources are discussed in greater detail in other sections.

Support of STEM-related competitions, fairs and camps, and STEM education

activities (63M-1-3204; 2 (d))

The STEM AC funds and oversees three grant programs: (1) Student Fairs, Camps and Competitions (FCC), (2) Classroom grants and (3) Organization grants. These three grant programs are funded from the STEM AC's operational budget.

FAIRS, CAMPS AND COMPETITIONS (FCC)

The FCC grants provided support directly to students to increase access to supplies for science fair projects, cover the costs of participation in summer camps or competitions such as First Lego League. Students were required to fill out their own grant application, and identify a mentor that could help them with oversight of the funds.

The STEM AC reported in last year's annual report that the FCC micro-grants were going to be temporarily suspended due to an unacceptable level of risk. This was in alignment with findings and recommendations in the audit performed by the Office of the Legislative Auditor General. The grant program is popular (the Center received considerable outcry from teachers and parents when the program was put on hold) and the STEM AC Board requested that the Center work to find a more effective and less risky mechanism for funding. The STEM AC hosted a focus group of teachers and administrators to identify a lower risk process. As a result, the STEM AC established the STEM Competition Grant, an improved version of the FCC micro grants. The STEM Competition Grant is intended to support Utah students, grades K-12, participating

in STEM competitions. Applications must be completed by a school-level representative on behalf of the students benefitting from the grant. The school-level representative will oversee the funding and be responsible for reporting outcomes. The inaugural submission just closed and 44 grant applications were submitted.

CLASSROOM GRANTS

Recognizing that innovation developed by successful teachers needs to be replicated and spread as widely as possible, grants are used to fund approaches to STEM education that enable teachers to implement innovative STEM ideas. Lesson plans and other materials are collected from participants in order to facilitate increased access to and involvement in innovative STEM curricula throughout Utah.

Teachers and students have expressed their excitement about what they were able to accomplish with these grants. Teachers have indicated that they were able to provide resources and involve students in STEM projects that would not have been possible any other way, and students have indicated increased desire to pursue STEM education and STEM careers.

For example, one fifth grade student said, "Before we had the robots I didn't know a lot about coding, and I didn't really enjoy it either. After we got the robots I learned so much, and coding is fun for me now. Because we got the robots I want to do more coding and get better at it."

Her teacher said that before they

received the grant, classes didn't have the tools to let students engage in hands on planning, building, and problem solving. "Because they've had this hands-on opportunity, they now think engineering is the coolest thing ever," she said.

In the 2016-17 school year classroom grants were funded for just under \$145,000 from the operational budget. This provided funding for over 200 innovative STEM ideas, directly impacting over 16,000 students statewide. A summary of the districts, grades, number of students and brief project descriptions is included as Appendix B.

ORGANIZATION GRANTS

The STEM AC funded 16 STEM-related organization grants that impacted approximately 65,000 students, with \$54,500 allocated from the operational budget. These organizations included Astro Camp Utah, Brigham Young University, Cache Makers 4-H Club, Davis School District, Discovery Gateway Children's Museum, Dixie State University, Four Corners School of Outdoor Education, FutureINDesign, San Juan County Library System, Southern Utah University, Spy Hop Productions Inc., Thanksgiving Point Institute, The San Juan Foundation, Utah State University Extension 4-H, Utah Valley University, Washington County School District, YMCA of Northern Utah.

Astro Camp Utah- Astro Camp creates an environment that promotes educational achievement, encourages goal setting, teaches teamwork skills,

and builds self esteem by providing unique hands-on learning experiences and positive role models. Students who attend AstroCamp programs (summer camps or field trips), engage in exciting, hands-on, authentic science learning activities. Students are introduced to a wide variety of physical science topics, and use what they learn to program robots, design Mars bases, and build and launch rockets. In both the Summer Camp and Field Trip experiences, the students build critical problem solving skills through collaboration with team members and learn core science content through the problem based instructional units. Summer camp field trips offer opportunities to visit STEM-focused companies and learn about college STEM programs.

Brigham Young University, Utah Underwater Robotics (UUR)- The mission of UUR is to teach and engage students in active learning STEM education. This is done by exposing students to essential engineering design thinking (problem spotting, problem solving, trouble shooting, algorithmic thinking, meta-cognition) by engaging students in STEM active learning curriculum, with a capstone experience. The capstone experience is an underwater robotics state-wide competition. The curriculum teaches students about robotics, programming, design, electronics, fluid dynamics, and engineering and technology careers. The UUR mission also builds in a natural correlation with STEM industry partners, where industry members are helping sponsor the UUR efforts - not only through funding, but man-power (ex., US Synthetics helps

package the robotics kits) and by being service exhibitors at the statewide UUR competition (ex., we have a gymnasium full of industry partners who come and show and tell about careers in STEM).

Cache Makers 4-H Club, Girls Space Science- Cache Makers was founded in 2013 to get more youth on a path to a STEM career by providing engaging and hands-on activities focused on STEM. Cache Makers recruits adult volunteers from local industry who mentor youth and lead the activities. This winning program has reached just under 1000 youth in the past two years, and has worked hard to reach out to minorities and girls, two underrepresented populations in Utah's STEM workforce. The focus is primarily on youth ages 10 - 17. Girls Space Science (Jan - Nov 2017) will focus on air quality, aviation and creating experiments that will fly on high altitude balloons. Girls will learn about Utah's air, sensors, inversions, and recording and interpreting data. Activities will include building sensor data logging devices, programing and interfacing sensors to arduino microcontrollers, deploying them at home, and collecting data. Another project/group will focus on creating experiments to fly on a high altitude balloons up to 110k feet. Another project will allow girls to get exposure to careers and STEM of the aviation industry. College students who are part of the Women in Aviation and their advisor (A USU Faculty member) will be the mentors for this 6 week project, and will teach girls about airplanes, aviation weather, navigation, and flying. Girls will get the opportunity to fly in a pilot training simulator and fly in an actual plane with an experience pilot.

They will get to sit in the cockpit of a plane in flight and will be given the opportunity to pilot the plane.

Davis School District, Exploratory STEM Clubs- Davis School District has adopted the Exploratory MESA program. The mission of the program is to engage students in grades four through six in meaningful STEM experiences in after school programs where they have time and opportunities to experience enrichment activities to guide future courses, interests, and goals. Students in upper Elementary school need to be exposed to STEM learning and activities so they can make good elective choices in junior and senior high school. Many of the courses available in secondary schools allow students additional training and insight as they prepare for careers in the STEM workforce. When students are taught with STEM best practices and understand the opportunities in STEM fields they are better prepared to make choices in STEM careers.

Discovery Gateway Children's Museum, Reaction Time and Potential Energy- Discovery Gateway Children's Museum (DGCM) is working to prepare young children and parents, as well as all kindergarten and 5th grade elementary school students and teachers for this endeavor by providing science outreach and sponsored admissions to the museum. DGCM's mission is to inspire children of all ages and abilities to imagine, discover and connect with their world to make a difference. It's our goal to encourage children at a very young age to imagine what they can become, to get them excited about

their futures and instill a zest for learning that will stay with them throughout their lives. We know that creating a fun and engaging path to science, technology, engineering, and math early on helps pave the way for continued academic achievement and helps further prepare and spark an interest in future STEM careers.

Dixie State University, Dixie PREP-

Dixie PREP provides three summers of rigorous academic instruction, educational hands-on projects, challenging homework assignments, and daily career awareness for 7th, 8th, and 9th grade students who have an interest and aptitude in Science, Technology, Engineering, and/or Mathematics fields. Dixie PREP strives to provide opportunities for high achieving students to pursue STEM studies and careers. Underrepresented and first generation students are encouraged to apply.

FutureINDesign- FutureINDesign

(FIND) is a 501(c)3 STEAM career development program for underserved, low to moderate-income, young adults. Their mission is to narrow the digital literacy gap in Utah, through hands-on training in key technology areas and functional life skills. FIND will reduce the constraints of intergenerational poverty, and create a pipeline of talent for Utah's growing technology workforce. FIND offers young adults (ages 16-20 years old) the opportunity to engage in a comprehensive and experiential workforce development training program. Participants are hired as Junior Designers and participate in a three-phase program. Junior Designers will develop job market

ready skills, including: graphic design, web development and coding. FIND will provide critical and professional experience that will decrease significant barriers and increase education and employment opportunities, becoming less susceptible harsh rise and falls of economic cycles.

FIND leverages the ability for Junior Designers to develop a professional portfolio of work by providing Utah's nonprofits, startup companies, and established businesses with design services on a sliding fee scale. Offering a path to a career in a high skilled field, participants will increase skill levels, and obtain higher levels of education leading to a career.

San Juan County Library System, Race

to STEM Awareness- The San Juan County Library System's mission is to offer resources to communities, and to keep an eye towards ensuring Utah's continued economic success in the global marketplace. The STEM Action Center organization grant will allow librarians at the seven branches to quickly direct K-12 students to reliable, quality, up-to-date information related to jobs in the energy sector, enabling them to obtain knowledge of the skills required in those careers. The desired books, videos and magazines have been hand-picked by our librarians to supplement current county-wide holdings, and a number of the titles are intended to appeal to children and teenagers, as well as job-seeking adults.

Southern Utah University, SUU PREP-

The SUU STEM Center's mission is to bring together people and resources to facilitate cutting-edge STEM initiatives that enhance teaching and learning

in the preK-16 environment Strategic Areas of Focus - 1) Create and support professional STEM learning, 2) Support STEM teaching and learning research, 3) Create and support STEM engagement opportunities. The purpose of SUU Prep is to identify students entering 7th grade who have an interest and aptitude in math and science, targeting, low income, female and underrepresented individuals and involve them in a three year summer program integrating STEM principles. This foundation will prepare them for advanced math at the high school level. SUU Prep prepares students to successfully pursue science, technology, engineering, and mathematics (STEM) studies at the college level. This foundation for comprehensive STEM education will enable individuals to gain the technical skills and competencies needed to compete in today's local and global marketplace.

Spy Hop Productions Inc., Digital Pathways Program- Spy Hop Productions, a digital media education center, provides a unique and valuable job training experience to youth in the Greater Salt Lake area, while giving youth the safety and support to explore their interests. This year, the STEM Action Center's Organization Grant helped support Spy Hop's Digital Pathways Program. Students in this program are immersed in a project-based student-driven learning environment in either film, audio, or digital design that infuses STEM applied learning and promotes the development of 21st century skills necessary for career and college readiness. Through the program youth are given access to workshops and classes that start at the foundational level and

lead to an advanced intensive program. As students graduate, they will be placed in internships at local businesses and given scholarships and priority work-study at partner higher education institutions.

Thanksgiving Point Institute, STEM Summer Camps- Thanksgiving Point Institute is a 501(c)(3) nonprofit farm, garden, and museum complex that draws upon the natural world to cultivate transformative family learning. Youth participating in Thanksgiving Point's programs are surrounded by STEM, literally and figuratively. Roaming with dinosaurs at the Museum of Ancient Life, getting hands on experience in horticulture and animal science at the working farm at Farm Country, investigating ecosystems in the 55-acres Ashton Gardens, and engaging in engineering solutions in the Museum of Natural Curiosity allow a one of a kind STEM inquiry experience. Throughout the programmatic experience, the learning allows the opportunity to build STEM abilities to do science and engineering.

The San Juan Foundation, San Juan High School Afterschool Programming- The after-school program offers one-on-one instruction and assistance to students completing homework assignments and access to the internet. The program runs two hours after school, Monday through Thursday, serving around twenty students each day.

Utah State University Extension 4-H, Utah 4-H Statewide STEM Engagement- Each year, Utah 4-H offers 3 summer events that engage 4-H youth across the state of Utah: Junior

Youth Conference, i-4-H, and State 4-H Contests. Hands-on, minds on, project- and design-based learning are at the root of the 4-H experience. These approaches spark creativity, critical thinking, collaboration, and other 21st century learning skills. USU Extension 4-H seeks to “pull” kids into STEM disciplines by generating interest and confidence, rather than pushing them to “do better in math and science. As the youth development program of the land grant university, 4-H helps youth see a path to follow for additional college education and STEM careers.

Utah Valley University, UVU PREP- UVU PREP provides three summers of rigorous academic instruction, educational hands-on projects, challenging homework assignments, daily career awareness, and field trips for 7th, 8th, and 9th grade students who have an interest and aptitude in Science, Technology, Engineering, and/or Mathematics fields. UVU PREP strives to provide opportunities for underrepresented and first generation students to pursue STEM studies and careers.

Utah Valley University, Math Adventure Camp- Research shows that negative attitudes towards mathematics leads to math avoidance. Those who avoid mathematics courses will not pursue careers in STEM fields. Therefore, the UVU Developmental Math Department created a week-long math adventure camp to positively influence campers’ math attitudes through exposure of math in an active-learning environment. Hopefully, students with a better math attitude will

be more likely to take more math classes and choose STEM careers. Research also shows that math attitudes are fixed by the age of nine. The math adventure camp focuses on elementary-age students in order to influence their math attitude for the better in hopes of having a lasting impression.

Washington County School District, TEEM- TEEM, or Teach Elementary Electricity and Magnetism, is a collaborative effort between five Southwestern Utah school districts and two business partners. The program builds the foundation for an interest in physics; specifically electricity, magnetism, and electronics. It also serves as a springboard for more advanced studies in the secondary schools. The labs will enhance teacher skill and ability, encourage student engagement, and promote the integrated STEM education with hands-on, collaborative, and relevant investigations.

YMCA of Northern Utah, STEM Summer Day Camp- The STEM Summer Day Camps provide many opportunities for campers to experiment, engineer, and explore all while receiving a well-rounded camp experience focused on achievement, relationship, and belonging. The Y brings in specialized instructors to provide unique, hands-on activities and demonstrations, offering campers more in-depth exposure to STEM topics.

Identification of best practices being used outside the state and learning tools

for K-12 classrooms (63M-1-3204 2 (h and i))

The STEM AC team continues to reach out to other states to explore best practices and position the State of Utah as a leader in STEM education and talent development. Annual attendance at the Midwest STEM Forum continues to be a valuable forum to learn about best practices in multiple states such as Kansas, Indiana, Iowa, Missouri and Wisconsin.

The STEM AC has been one of ten states invited to work with the CANMASS State Leadership in Computing effort. This project is funded by the National Science Foundation, Microsoft and Google. It is intended to bring states that are leading out in statewide computing initiatives to share best practices. The STEM AC has also been working with several national groups that support computing that include code.org, Expanding Computing Education Pathways (ECEP) and CS4All. These groups have provided resources that support K-12 computer science training for teachers and access to the latest in computer science curriculum materials and activities.

The STEM AC will join STEMx for a second year. The STEMx network is a multi-state STEM network developed for states, by states. The STEMx network consists of 21 states and has created an accessible platform that is shared by member states. This platform allows for access to data and tools that can be used to support STEM efforts. This continues to allow the STEM AC to become more connected to efforts from across the country.

The STEM AC has a collaborative grant with Carnegie Mellon University's CREATE Lab (CMU) and the Infosys Foundation. The grant supports the creation of a CREATE Lab Satellite in Utah, bringing innovative, cross-disciplinary resources in computing and robotics to K-16 students and teachers across the state. This program will be discussed in greater detail in the K-16 Computing Partnership section.

The STEM AC has been an invited participant to the CS4All and code.org national events and efforts. This has positioned Utah, and its work with computing initiative. Additionally, the STEM AC was invited to contribute to two Education Commission of the States reports, STEM Playbook and Book of the States (see Appendices C and D for these reports).

Provide a Utah best practices database (63M-1-3204, 2 (j))

The Curiosity Unleashed (STEM.utah.gov) website provides access to Utah best practices and content that targets students, parents, educators and industry partners. The content consists of innovative STEM materials for use in the classroom and at home. These materials range from audio and video-based content to links that showcase best practices by Utah STEM stakeholders as well as materials that are hosted by other high quality websites. The website includes information that showcases the variety of career options, the educational pathways and the Utah professionals that represent these STEM career choices. The website includes information regarding STEM events and

activities across the State; a description of these events, along with dates, locations and a point of contact are included. Events are posted monthly on a calendar. This content is presented as a searchable library that allows a user to find resources of interest. Contests for students will be hosted, in partnership with industry partners, that allow students to provide input to the website and become more involved in STEM. The annual Best Practices Conference provides an opportunity to share and collect best practices.

Keep track of how the best practices database is being used and how many are using it

63M-1-3204 2 (k) i and ii –

The Curiosity Unleashed (STEM.utah.gov) website provides access to Utah best practices and content that targets students, parents, educators and industry partners. The content consists of innovative STEM materials for use in the classroom and at home. These materials range from audio and video-based content to links that showcase best practices by Utah STEM stakeholders as well as materials that are hosted by other high quality websites. The content includes information that showcases the variety of career options, the educational pathways and the Utah professionals that represent these STEM career choices. The site includes information regarding STEM events and activities across the State; a description of these events, along with dates, locations and a point of contact are included. Events are posted monthly on a calendar. This content is presented as

a searchable library that allows a user to find resources of interest. Contests for students will be hosted, in partnership with industry partners, that allow students to provide input to the website and become more involved in STEM.

The following information has been tracked based upon use of the website: during the 2017 fiscal year the STEM Action Center website had 83,130 pageviews, 20,094 new users, and 31,739 sessions. The social media accounts for the Center include Facebook (1,357 followers), Twitter (935 followers), Instagram (295 followers), LinkedIn (170 followers) and Google+ (17 followers).

The objective of the web assets is to inform and promote STEM opportunities to community members and foster an online network dedicated to STEM education.

The STEM Action Center has a combined total of 2,774 followers across all social media platforms, a 39 percent increase from last fiscal year's cumulative 1,993 followers. An average of 24 posts/tweets a month promoted events and services, and highlighted STEM news across the state and nation. Our social media accounts drive traffic to our main website, STEM.utah.gov and event-affiliated websites such as stembestpractices.com. Social media is a valuable tool for promoting events. Traffic increases before and after events as more and more individuals rely on social media for information. Using the STEM Best Practices conference as anecdotal evidence, we find reach increases by approximately 3,000 people

in both the month prior to, and the month after the event.

The STEM Action Center distributes a monthly newsletter that has a reach of over 4,100 Utahns, with more than 1,250 unique sign-ups at the STEM.utah.gov website since its creation in December of 2014. The newsletter receives an average open rate of 23.6%.

Join and participate in a national STEM network (63M-1-3204 2(I))

The STEM AC joined STEMx, a national level organization that has evolved to be more service-oriented, with less focus on membership (thus, less overpriced membership dues). This organization is also led by states and their STEM initiatives, which is more appropriate for the STEM AC. The STEM AC frequently participates in webinars with STEMx and has learned about some successful practices in other states. Leadership at STEMx has changed in the past few months and the STEM AC is waiting, and observing, before joining to see if this change of leadership will negatively impact the quality of services from STEMx.

The STEM AC continues to engage with other national organizations such as STEMConnector, but not on a membership basis.

STEM School Designation (63M-1-3204, 2 (n))

The STEM AC, working with the USBE, generated a comprehensive plan for a STEM School Designation program which was included in the FY15 annual

report. This plan is comprised of ten dimensions covering 37 elements which schools self-evaluate and provide narrative and artifact evidence of those scores for a review team to evaluate. The Utah State Board of Education and the STEM AC Executive Board approved the criteria in FY15. It is important to note the application to become a designated STEM School is not easy. It takes time and considerable thought and strategy. In spite of the level of work required to complete an application there has been considerable excitement. The first solicitation for applications was released in early September of 2015, with 19 schools awarded a designation at one of the four designation levels in FY16. An additional 12 dual language immersion (DLI) schools were also granted STEM School Designations, starting with their 1st grade teachers and students to intentionally implement STEM into their school days. In FY17, seven additional schools were awarded new designations, with an additional school applying for a higher level of designation from that awarded the previous year. A summary of the awardees is included as Appendix E.

Support best methods of high quality professional development for K-12 STEM Education (63M-1-3204 2 (o))

OVERVIEW:

The STEM AC has been working collaboratively with the USBE to design and deploy a high quality professional learning platform to LEAs. The statute requires that a video-based, online platform be used for the deployment of professional development. The

statute also allows for hybrid learning activities, such as face-to-face professional learning opportunities. Recent changes in statute remove the requirement to use a procured, vendor product for the video-based, online platform which will begin in FY18. This will allow LEAs to choose the platform that works best for them such as Google, Schoology or Canvas, or allow them to continue to use Edivate. The grant applications could request support for Edivate licenses as well as support for other professional learning activities such as coaching or mentoring, additional professional learning time off-contract, and other supports as determined locally. This is a competitive grant program and the grants are typically awarded in late spring.

School year 2016-17: The 2016-17 school year represented the second full year of implementation for Edivate. LEAs submitted their grant applications with a total request of 15,212 Edivate licenses at the beginning of the year and 55 LEAs with 78 different projects participated. STEM AC negotiated with SINET and they agreed to donate up to 7,312 licenses due to low usage from the previous full year of implementation. The product provider worked with LEAs to develop a more robust implementation plan around the use of the Edivate platform.

The overall purpose of the more robust implementation plan was to assist each participating LEA to:

- Establish a full, detailed strategic professional learning vision and

implementation plan.

- Identify goals and objectives of the implementation
- Create metrics and measures of success for the implementation
- Align the use of Edivate tools and resources in support of the overall vision and goals for professional growth.

The STEM AC worked closely with School Improvement Network (SINET), the sole product provider for this project, to focus on increasing usage or adoption of the platform. It was determined that no new custom content would be created in FY17, and to focus instead on the intentional use of Edivate. There were numerous strategies deployed by SINET but it became clear by the middle of the school year that usage was still not increasing to an acceptable level. The STEM AC team spent a considerable amount of time reaching out to partners in LEAs to determine the reasons behind the slow adoption of the platform. Work has been done to provide site leaders with research and other support materials addressing how to best use self-reflection to identify specific areas for growth and exemplar teaching behaviors. The intent was that with this support educators and administrators might be more likely to use the research-supported practice of self reflection via video,

Feedback from participating LEAs was extremely helpful and allowed the STEM AC, working with LEAs, the USBE and SINET, to identify key issues regarding product usage. These included (1) LEAs starting off slowly,

leading to low usage throughout the school year (2) defined usage expectations with some misunderstand about usage outside of watched videos (3) low teacher buy-in for a single year change in professional learning focus (4) teacher reluctance to watch themselves for self-reflection and evaluation and (6) technical issues for uploading of teacher self-videos. A complete matrix is included as Appendix F that outlines the issues and challenges that have been identified, the solutions that are being applied to those challenges and how the STEM AC, working with LEAs, SINET and USBE, will track the degree of success with each solution.

Specific strategies to address the above issues

Project timeline

The STEM AC worked diligently with LEAs to determine why the video-based, online platform was not being adopted at higher usage rates. It was determined that not having a product or system in place from the beginning of the school year greatly reduced the likelihood of that product being used regularly. STEM AC used this feedback to change the application timeline for participating schools to ensure grants were awarded in early May, and required participant lists, used to create product accounts, by mid-July to ensure all participants had accounts in place before the school year started.

Changes to the project application were also made, requiring participating LEA's to provide a month-by-month calendar of professional learning

opportunities, ensuring a consistent, year-long effort to improve teacher learning of STEM. Applicants were encouraged to use their submitted Digital Teaching and Learning plans, submitted previously to USBE, to create plans that fit into what they had already planned for other state initiatives. This was well received anecdotally, and encouraged applicants to develop a more streamlined view of professional learning at their site.

The updated grant solicitation includes (1) the requirement for all participants to engage in video based self reflection (2) the requirement for the use of SMART goals with specific measurement metrics to address the lack of defined goals relating to STEM professional development (3) clearly defined goals relating to STEM-specific professional development over the course of the school year, and (4) a monthly breakdown of professional learning opportunities including STEM-related learning.

Applications were due March 31, 2017. After initial review, it was noted that funding requests were more than double the amount of funds available. Applicants were informed and asked to revisit their proposed plans and budgets, and were given an additional two weeks to refine their plans. This was well received, and did result in a significant reduction in requested costs. Revised applications were reviewed and awarded by May 5, 2017 to allow for a timely deployment for the 2017-18 school year. Feedback from LEAs has been overwhelmingly positive, particularly in regards to being able

to define local needs and solutions regarding STEM learning for educators. Specifically, district leaders are excited about the defined opportunities for SEEd (middle school science) standards exploration and application. A summary of LEAs that were awarded and short descriptions of the goals of the grants is included as Appendix.

Usage expectations

The 16-17 school year was the first year to have specific time used requirements associated with the use of Edivate. While this provided grantees a clear minimum expectation of 20 minutes per month for each allocated license, there was misunderstanding about what that usage could look like. Over the course of several months while visiting with schools, both STEM AC and SINET staff took deliberate efforts to explain although users could only track the amount of time spent watching videos, others tasks within Edivate also resulted in a time task equivalent. Completing a learning activity, for example, comprised of watching a video, answering reflection questions, and completing a follow up activity 72 hours later would result in significantly more application by an educator than just watching a video. These non-video tasks, designed to make the videos applicable to teachers, were assigned time equivalents to acknowledge the importance of applying what had been learned. This change was positively received by many educators, who had initially been watching videos to fill a requirement, but then changed their approach to engage in a topic they were truly interested in that could influence their instruction. For the 17-18 school

year, it is expected that these task/time equivalents for those using Edivate will continue to improve teacher engagement. Additionally, specific courses were created within Edivate for applicants choosing to continue use of the program that sets out specific monthly tasks for a systemic approach to the resources available within the Edivate platform.

Teacher buy-in

This challenge has multiple facets associated with it. First, teachers felt they were being asked to just watch videos, without expectation to implement change. This was addressed with task/time equivalents for non-video tasks within Edivate. Another large challenge associated with teacher buy-in was the year-to-year aspect of this grant. Teachers felt they did not need to meet grant expectations because they would not be continuing a STEM focus into the next school year. This was addressed by allowing applicants to ask for either 1 year or 3 years of funding. For the 17-18 school year, half of the awarded grants are for 3 years of professional learning, while the other half stayed with one year of funding. Those receiving one year of funding were primarily sites that were implementing something new and wanted to try it for a year before getting locked into a plan that may not fill their needs for three years.

Product selection

Edivate, while a tool that is very useful particularly in charter schools and throughout small districts, was reported to be a poor fit for some LEAs, including

several large districts. As mentioned previously, statutory language was changed in the 2017 legislative session to allow sites to choose a product besides the state-procured product. This will also address some of the technical issues faced by users. While charter schools and small districts have been able to purchase or provide the same devices for all of their teachers, other LEAs did not have a single set of technological tools being used which made uploading videos and using other features within Edvocate a challenge. By allowing LEAs to determine their own digital delivery system, they are also limiting the number of platforms a teacher needs to learn in order to complete the work set out for them in a more familiar format.

Recognize a high school student's achievement in STEM Fairs, Camps and Competitions (63M-1-3204, 2 (p))

The Fairs, Camps and Competitions (FCC) program was on hold this year as previously discussed. However, there were several activities that recognized achievement in STEM by districts, schools, teachers and students. The STEM AC, in partnership with Comcast and the Utah Technology Council, recognized student achievement with the second annual STEMi Awards. The STEM AC, working with CenturyLink and the Utah Jazz, recognized outstanding students in STEM during half time at eight Jazz games last season. Finally, the STEM AC worked with BioUtah for a second year, to recognize five STEM students at their

annual innovation awards event. All of these events are discussed in greater detail in previous sections.

The STEM AC has worked with KUTV on more than 40 STEM stories over the 2016 fiscal year ranging from student awardees and STEM company spotlights. You can find these features on the KUTV website at <http://kutv.com/features/stem>.

The STEM AC launched a new program, Spotlight, that provides an opportunity to share stories about Utah students, teachers and companies. The STEM AC reaches out to districts, schools, teachers, students, parents and even companies to showcase innovative efforts in STEM. The Spotlights are sent to educators, businesses and legislators so that they are able to see what great things are going on in their communities. The current portfolio of Spotlights can be found at <https://stem.utah.gov/weeklyspotlights/>.

Develop and distribute STEM information to parents of students being served by the STEM AC (63M-1-3204, 2 (r))

The STEM MX mobile app, previously discussed, will provide access to resources for parents. This app is now available in the app store and has over 500 profiles submitted, with numerous connections already being made. The STEM AC also reaches out to parents when they attend student STEM events, such as the DIY fair. Parents are encouraged to sign up for the newsletter and to follow the STEM AC on social media, where they can find out about

STEM events across the state and student grant opportunities. The second annual STEM Fest attracted more than 4,500 family participants on open family night.

A specific section on the website is dedicated to parents, where they can learn the significance of STEM and also keep up to speed on the latest events.

Support targeted high quality professional development for improved instruction in education, including improved instructional materials that are dynamic and engaging and the use of applied instruction (63M-1-3204, 2(s) i - iii)

The STEM AC strives to align all professional development work the criteria that define high quality professional development that are defined in statute. The STEM AC continues to work in partnership with the math and science specialists at the USBE, as well as partners in higher education, to implement an Elementary STEM Endorsement. This endorsement consists of a sequence of six courses that will provide elementary educators with a more in depth understanding of critical STEM topics and innovative ways to implement applied or hands on instruction in their classrooms. The focus of the endorsement is the use of technology or engineering-based applications for science and math. The endorsement program completed its first 2 year cohort cycle in May of 2017. Initially, 332 teachers (there ten

additional teachers funded by other means) enrolled and 330 teachers having completed all six courses. The data collected this past year will be included in the third party evaluation report, which will be provided as an addendum in late October or early November, 2017.

Finally, the STEM AC is working with the USBE and selected product providers to deploy video-based, online professional learning tools for K-12 STEM educators. The professional learning platform is discussed in detail in previous sections.

Ensure that an online college readiness assessment tool be accessible by public education students and higher education students. (63M-1-3204, 2 (t) i and ii)

The STEM AC, working in partnership with the USBE and Utah Education Network, determined that EdReady did not meet Utah's college readiness assessment needs. LEAs' interest in using EdReady was also insufficient to justify renewing the contract. The math personalized learning tool ALEKS, a McGraw-Hill product, is designed to help students prepare for college math and shows to be a promising supplemental tool in helping students gain greater proficiency in their college math skills.

ALEKS assesses grade level proficiency in high school students. These assessments provide students with a clear understanding of what they have mastered, and what they still

need to learn. These results can easily be compared to college proficiency standards to determine if they are at performance levels in math that meet admission requirements. ALEKS also gives students access to developmental math curriculum online that allows them to improve in areas that have been identified as deficient for college admission.

The Board may prescribe other duties for the STEM AC in addition to the responsibilities described in this section (63M-1-3204, 3)

The STEM AC has been involved in additional activities that include the following:

STEM AC STRATEGIC PLANNING

The STEM AC, working with its Executive Advisory Board, spent four months during FY17 to develop a 3-year strategic plan for the STEM AC. The strategic plan addresses statutory requirements connected to the funding and the actions that the STEM AC has taken to align with statutory requirements. It also includes impact and outcomes data that will be tracked for the next three years for all projects, including those not supported by legislative funds. The 3-year strategic plan is included as Appendix H. The Effectiveness and Accountability matrices for each project, along with logic models, are included in the strategic plan.

LEGISLATIVE AUDIT

The Office of Legislative Auditors General (OLAG) conducted an audit of the STEM AC beginning in

December of 2016 and ending June 14, 2017. The audit looked at process (financial and procurement) and program effectiveness. The audit report summarized the following findings: While performance measures have improved, the STEM AC needs better coordination of its measures and lacks the ability to measure long-term success. Most of the STEM AC's funding directly benefitted students in 2016. Through visits with teachers and district administrators, we found that schools are doing things with STEM subjects that were previously unavailable to them.

Statutory requirements may inhibit the STEM AC's effectiveness by requiring programs that lack either end user utility or impact.

Financial controls over vendor procurements appear appropriate.

The STEM AC's financial reporting has improved.

The following recommendations were made:

- The STEM AC consult with its third-party evaluator to make clear data requirements for vendors to ensure valid data for measuring program effectiveness is obtained.
- The STEM AC provide annual public performance reports, based on performance goals and measures, to the Legislature.
- The STEM AC utilize future longitudinal data from the Department of Workforce Services in measuring STEM AC impact in higher education and in STEM industries.
- The STEM AC develop measures for its classroom grants initiative and

- all other future initiatives to better determine the effect of its funding.
- The STEM AC provide programs and products with proven track records and buy-in from the teachers who will be using it.
- The STEM AC not require its own professional development software vendor be used for LEAs to qualify for other professional development resources. This recommendation is consistent with legislative changes from the recently passed HB426.

The report noted several areas where the STEM AC had been proactive in correcting several areas of weakness. This was due to an internal audit that the STEM AC conducted almost two years ago. The STEM AC is confident that the performance measures are improving and will continue to improve over the next year.

The STEM AC has created a corrective actions document for the legislative audit and will be spending the next year applying solutions to improve those areas or efforts found to be in need of attention.

K-16 COMPUTER SCIENCE PARTNERSHIP

Overview

There are two synergistic approaches to growing Utah's CS/IT talent: (1) meet short-term needs with accelerated training or "up skilling" and (2) a long-term sustainable approach working with education and business partners to build programs in computing.

The STEM AC, working with industry partners, determined that the STEM

AC was poised to lead out on working with K-16 partners to build out a strategy to support the creation of articulated computing programs. The results were three key strategic actions: (1) a pilot program using one time, carry over funds from the STEM AC's STEM Industry Certification program, (2) an industry-led effort to secure legislative funds for additional support to LEAs and (3) an industry-led collaboration to develop an apprenticeship program in computing. The STEM AC has been working with K-16 education partners to identify the the resource gaps that are preventing LEAs from offering comprehensive computing programs in K-12. The areas of focus for identifying resource gaps include innovative outreach, engagement and awareness activities (with a focus on underrepresented populations), robust and industry-relevant content for courses, classroom engagement with industry partners (this can include time spent in elementary classrooms as well as instruction in secondary courses), elementary teachers with sufficient background and familiarity with coding, a sufficient number of secondary teachers, work-based learning opportunities, and effective articulation with postsecondary partners that increases retention of students in undergraduate programs.

The STEM AC used one time carry over funds to launch a K-16 Computing Partnership pilot grant program (see below). This pilot program fulfilled two goals: (1) provide pilot funding to LEAs that were ready to develop and implement computing programs

according to the criteria discussed in the previous paragraph and (2) gather information to determine the level of interest by LEAs for creating computing programs. This information helped to inform industry as they led out on securing funding in the 2017 legislative session (greater detail is provided in following narrative).

K-16 Computing Partnership -- PILOT

Grants were solicited through a formal, competitive Requests for Grant solicitation, with external review of all submissions.

As a reminder, the solicitation was used for dual purposes: (1) to solicit grants for review and funding and (2) solicit information that could be used to inform the industry-led legislative efforts the resulted in SB190.

The following pilot grants are moving into their first full year of implementation, with initial outcomes expected during the first quarter of the 2017-18 school year.

SB190: K-16 Computing Partnership -- ONGOING

The industry-led effort was successful this past legislative session with SB190 passing and providing \$1.255M in ongoing funds. The first solicitation of grants has closed and 25 complete grants were submitted. There were 24 incomplete and the STEM AC will follow up with non-duplicative applicants and work with them to see how their applications can be ready for the next fiscal year.

There were nearly 40 partners in attendance at the Industry Advisory meeting, representing Adobe, 3M, Avanti, Comcast, Ancestry.com, Vivint, Microsoft, Google, Oracle, IM Flash, Goldman Sachs, eBay, Hill Air Force Base, AT&T, Inside Sales, OC Tanner, Utah Technology Council, Womens Tech Council, and Silicon Slopes. This industry group has agreed to stay on to support the computing initiative and has grown with the additional of BAE Systems, Intermountain Healthcare, Domo, Instructure and Orbital ATK.

An additional resource that will be leveraged in the K-16 Computing Partnership project is the continued partnership with code.org, in collaboration with the USBE. Code.org awarded a two-year grant that provided ongoing educator professional learning for the key courses in the computing pathway, including: Computer Science Discoveries (CSD; 6th through 10th grade), AP Computer Science Principles (AP CSP; 11th or 12th grade), and AP Computer Science (AP CS; 11th or 12th grade). Additional training provided for by the grant included: (1) Fundamentals of Computer Science, which provides professional learning for elementary teachers to bring Hour of Code and Code Studio to their classrooms; (2) Computer Science in Science, which was new to the pathway and helped science teachers integrate relevant computer science concepts that align with state science standards into their science classes; and Exploring Computer Science (ECS), an option in gaining a USBE computer science

Computing Pilot Grants – Awarded in May 2017

American International School of Utah	Expand current offerings to include AP Computer Science and Web Development classes and Work-based Learning opportunities	\$67,500
Desert Hills High School	Purchase computer lab hardware to teach PC repair skills. Develop Networking+ and Security+ stackable credentials.	\$20,635
Salt Lake Center for Science Education	Offer High School Robotics and hybrid Java Programming and Web Development classes. Offer middle school pipeline classes	\$70,747
South Sanpete, North Sanpete and Sevier School Districts	Foster classroom and onsite experiences to include interactive instruction/online curriculum that will extend to rural classrooms, allowing students to work together while connecting with post-secondary education and industry.	\$112,650
Tooele School District	Increase Work-based Learning opportunities, streamline articulation agreements with US And TATC. Explore expansion of Computer Science/IT offerings to Wendover and Dugway.	\$184,481
Ogden School District	Increase equity and access to Computer Science curriculum, delivered by teachers trained in national-endorsed programs. Provide Work-based Learning opportunities and industry-recognized certifications.	\$114,000
Emery School District	Address skills gaps and align courses with industry-recognized certifications. Broadcast courses to Green River High School and provide access to clubs and competitions.	\$281,845



endorsement.

During FY2017, code.org sponsored \$53,481 in professional learning costs. This funding, combined with \$33,000 in grant dollars from Hill Air Force Base, provided training, facilitation, classroom supplies and support services to a minimum of 135 elementary through high school teachers.

Computing Apprenticeship

There are many Utah companies that support a variety of internship opportunities to students. However, company partners have indicated that there are several gaps in the process for which they could use resources and support to improve their early employment opportunities.

The STEM AC has been working with the DWS and industry partners to create multiple apprenticeship models. This is an industry-led project and will provide multiple opportunities students to engage in “earn while you learn” opportunities with companies that will hire them as apprentices. There will be several higher education partners working in the collaborative. The partners are also working to leverage their work to secure federal funds, with the support of Senator Hatch’s office.

Communication and Outreach Strategy

The success of the K-16 computing efforts relies on an effective communication and outreach strategy. Computing programs are part of the Career and Technical Education (CTE) portfolio. It has been recognized in Utah, as well as in many other states,

that CTE programs suffer from a myriad of negative misperceptions. In order to ensure that any efforts with CTE programs realize their full potential for participation, the stigma that plagues CTE programs needs to be addressed.

The STEM AC and partners from higher education, the USBE, several LEAs and the Utah DWS, submitted a proposal to the National Science Foundation’s Advanced Technology Education (ATE) program. The focus of this grant is to work collaboratively to create a new communication and outreach strategy for Career and Technical Education (CTE) programs, which would include Computer Science and Information Technology (CS/IT). This grant has been reviewed and the program officer has requested modifications, which is a good sign of potential funding. If funded, this grant would be a three year project.

HIGHER EDUCATION COLLABORATION

The STEM AC has been working strategically with higher education partners on several projects, including CREATE labs and the STEM Equity Pipeline.

(1) STEM Equity Pipeline: A key focus of the STEM AC is to promote and support equity and access to all students. The STEM AC initiated the STEM Equity Pipeline in 2014, in partnership with Utah Valley University, the National Alliance for Partnerships in Equity (NAPE) and Park City School District. The pilot was funded by the National Science Foundation and been a huge success. The overarching

purpose of the STEM Equity Pipeline project is to use root cause analysis to determine the reasons why enrollments for underrepresented populations are unacceptably low in STEM education and career pathways. A pilot was conducted with Park City School District (PCSD) in their middle, junior, and high schools. The first year of root cause analysis was followed by data-driven changes during year two. Year three enrollments for girls in select STEM courses increased dramatically. Data is being collected for Hispanic and Latino students for year four enrollments. The data from this project is available upon request.

The STEM Equity Pipeline root cause analysis work has been scaled to Ogden and Granite School Districts with support from a grant from Hill Air Force Base. Ogden School District just completed their root cause analysis work and is in the process of conducting micro-messaging training, which addresses one of the identified root causes. Granite School District will spend the 2017-18 school year conducting root cause analysis work at selected middle and high schools.

(2) CREATE Labs: The STEM AC has been working in partnership with the USBE for the past three years to provide resources to K-16 partners for computing programs. These efforts included supporting industry to secure state funding and vetting additional resources that LEAs could integrate into their computing efforts. The STEM AC, along with LEA partners focused on finding resources that would support K-8 computing, as well

as be cross-disciplinary in nature.

The STEM AC received a grant in spring of 2016 from the CREATE Lab at Carnegie Mellon University (CMU), which is funded by the Infosys Foundation, to establish a CREATE Lab satellite. The overarching purpose of this grant, with the creation of the satellite, is to provide support to implement engaging coding and robotics projects that integrate across the arts, humanities, social sciences, and environmental sciences. The projects specifically target elementary and middle school students. The grant provides resources for four projects and intensive training for project partners to incorporate the projects into the classroom. The pilot for the satellite project included Utah Valley University and Southern Utah University, along with the school districts in their service areas. The initial training has been completed and school districts are implementing two of the projects, Arts and Bots and Hear Me, during the 2017-18 school year. These resources will be made available to LEAs as part of the K-16 Computing Partnership grant program that is previously discussed in this report.

OUTREACH AND ENGAGEMENT

The STEM AC conducts the following outreach and engagement activities as a means to provide project support to teachers and promote STEM AC resources. There are numerous outreach and engagement activities that are included in previous sections, such as the industry engagement portion of the report.

Visits with district superintendents:

The STEM AC continues to work to ensure that all superintendents are familiar with the STEM AC and its resources, and are supportive of their district's participation in STEM AC projects. The Executive Director conducted visits to districts, as well as engage with the Utah State Superintendents Association meetings on relevant topics. The district visits typically take place on site in superintendents' offices, with their administrative teams. The Utah State Superintendents Association, for the first time since the inception of the STEM AC, supported the SB190 legislation, K-16 Computing Partnerships, in their legislative position document. Further the STEM AC has received several requests for support from LEA administrators and LEA school board members due to recommendations from the Utah State Superintendents Association to contact the Center.

This outreach work has expanded to include district school boards, including the Rural School District Association. The STEM AC has received several requests to help school boards access resources for their schools and districts. The STEM AC has committed to attending the Rural School District Association meetings to understand more fully how to support rural districts and their STEM needs.

Site visits to STEM AC projects: The STEM AC team conducted site visits for several projects during FY 2016.

(1) Applied Science: The STEM AC continued to conduct site visits during the 2016-17 school year to districts that

participated in the Applied Science grant program, which ended over a year ago. Teachers continue to use the project ideas and materials, that are associated with the programs that were funded. However, most districts have decided to not invest further in these products. The STEM AC plans to check in with the participants during the 2017-18 school year to assess their usage of the curriculum materials and project ideas to determine if these resources have continuing impact, or will have long-term impact.

(2) Classroom grants: Classroom grants for the 2016-17 school year varied in scope and subject. Team members were able to observe multiple projects on-site, including the classroom grant projects mentioned on page 14 in this document. During the 2016-2017 school year, 19 classroom visits for classroom grants were made and several of them are featured in the Spotlight stories and a summary can be found in Appendix XX.

(3) Road trips: The STEM AC team conducted its second annual multi-week "road trip" across the state to provide additional professional learning to teachers for the use of the math personalized learning tools and the professional learning platform, Edivate. The STEM Roadshow consisted of seven events around the State of Utah during the first and second week of August 2017. These events were designed to get the year off on the right foot, providing teachers with opportunities to collaborate, share successes, find solutions to challenges, and receive professional development related to products provided by the STEM Action

Center's Math and/or Professional Development grant programs. Across all seven locations (Cedar City, Richfield, Springville, West Jordan, Orem, Layton, and North Logan) 363 participants attended sessions providing training and collaboration opportunities related to mathematics technology, and 34 participants attended training for products provided by Professional Development grants. In total 397 participants from 128 schools in 23 districts and 15 charters attended.

Based on lessons learned from the first year, we made logistical adjustments, including changes to the on site registration process, and limits for session sizes. We received a lot of positive feedback from teachers about these improvements. One teacher said that due to the smaller session size, she was really able to connect with the other teachers and learn valuable lessons about integrating this software into her classroom. She was particularly excited about the ideas and suggestions she received about how to increase student motivation and drive students' success using data from the program.

Sponsorship of events for students: The STEM AC uses a portion of its operational funds to sponsor STEM-related events. A total of 32 events were sponsored monetarily for the FY2017 and 18 events were given in-kind donations such as exhibiting or promotional items, with an estimated 132,400 students impacted and a total of \$43,965 allocated. These are discussed in greater detail in a previous

section.

The STEM Action Center distributes a monthly newsletter that has a reach of over 4,000 Utahns, with more than 1,500 unique sign-ups at the STEM. utah.gov website since its creation in December of 2014. The newsletter receives an average open rate of 23.05%.

Acquisition of STEM education related instructional technology program –

Research and development of education related instructional technology (63M-1-3205)

The STEM AC completed its third full year of training and implementation to support the K-12 Math Personalized Learning project (2016-17 school year).

The overall goal of this program is to provide supplemental math support to teachers and students in an innovative approach that includes: (1) ongoing research of best practices in the use of supplemental instructional tools (2) using a statewide approach to design and implement a robust analysis of the use of content-specific supplemental technology-based tools and (3) a statewide approach to implement a program that leverages state contracting and critical mass for cost effective access and (4) integrating a mechanism that allows for continuous assessment of new products at no cost to the state.

A total of 135,087 students had access to licenses provided by the STEM AC for math personalized learning tools. The program covered 21% of

all Utah students in grades K-12, with 33 districts and 15 charter schools participating (550 schools total). Six math personalized learning products were used during the second year.

There were numerous “lessons learned” from each full year of implementation, and the STEM AC was very intentional about applying solutions to the issues that emerged. A matrix is provided in Appendix I that describes the “lessons learned” by school year and solutions that were applied to the identified challenges. The spreadsheet also describes “lessons learned” from the 2016-17 school year and the solutions that are currently being applied and tracked.

We have learned that buy-in at all levels is critical to success. Initially, programs were coordinated with district level administration, and it resulted in school building administration and teachers not always knowing they had access to grant resources or not understanding the purpose of the program or its data and reporting needs. This often lead to low usage and missed opportunities in data collection. Though the system we used in 2016-17 was still a district application, school principals were required to sign a letter of commitment promising to ensure that students would have access to technology for at least 45 minutes per week to use the math software provided. We also required signatures from the IT Director at each LEA to ensure they were aware of any technology provided by the grant and that they would have adequate bandwidth and infrastructure prior to implementation. We have also made

efforts the past two years to provide summer learning opportunities for classroom teachers to increase buy-in at the teacher level. We call this series of learning opportunities the “STEM Roadshow”, and travel the state with product providers, setting up regional meetings about a month prior to the start of school to get as many classroom teacher participants comfortable with the products they will be using over the course of the year.

In year one product providers also had difficulty distributing licenses and arranging professional development. To mitigate these issues, all applications in year two and three were required to list “on-site” contacts. Product providers were able to distribute the majority of awarded licenses and facilitate professional development right at the beginning of the school year.

The contract in year two also required product providers to distribute license and arrange professional development before they received payment, which may have encouraged them to put forth extra effort to ensure timely completion of these activities. We also made sure that usage expectations were clearly communicated to administrators and math coordinators. Though this helped immensely, we discovered that in some cases the contact information for the school level point of contact was incomplete or incorrect. For the 2017-18 school year, we changed the application to school level application requiring signatures from a district administrator and the IT director. While there was some resistance to this from some district administrators, we hope that it will improve communication between

the STEM Action Center and each individual site we work with.

The first three years, applications were not available until the end of the school year or beginning of the summer, and sometimes administrators did not see their award notifications until the beginning of the next school year. Based on feedback from both district and school level administrators, we opened the application for the 2017-18 school year early in the spring, and sent award notifications in April. This change allowed school and district administrators to more strategically plan implementation.

In year two, the evaluation team did not receive SSID numbers from all schools participating in the grant, which resulted in a small sample size for some products. In year three, the evaluation team was required to verify receipt of SSID numbers for 2016-17 before 2017-18 awards were authorized. As a result we received SSID numbers from all but two schools.

As this program has matured, we have found there is a difference between “fidelity”- using a product for a certain amount of time, and effective implementation. When working to ensure products are used effectively with over 100 thousand students, the easiest metric to look at is minutes of use. While this metric has been valuable, it does not provide a complete picture of what effective usage looks like. Over the 2016-17 school year, we learned that we need to increase our focus on implementation strategies and effective use of reporting features as well. Using

data from one of these personalized learning programs, one 30-year veteran teacher was able to help 89% of her students reach grade level proficiency in the 2016-17 school year, outperforming the state average by over 45%. As we shared this success story with teachers during our “STEM roadshow,” several other teachers shared similar success stories from their own classrooms. Each of them emphasized the importance of using these supplemental products strategically, rather than just focusing on minutes of use and other product specific “fidelity” requirements.

Due to limited funding we decided to focus on providing the product to schools where there was evidence that teachers would use the products and receive support from administrators. Awarded schools that had zero usage over the course of year were not provided with technology in year three.

The third party evaluator for the STEM AC has been working with the USBE to access end of year test scores (SAGE) for the 2016-17 school year to align with use of the digital learning tools. The data was provided to the STEM AC on Friday September 25th., 2015 for the first year and we anticipate a similar delivery or release date for the 2016-17 school year SAGE data. The evaluator will provide a full report by and it will be included as an addendum to this report once the SAGE data is received and adequate time has passed for completion of the report.

Third party evaluation report on performance of students

participating in STEM Action Center programs as collected in Subsection 63M-1-3204(4).

The contract with the previous third party evaluator, Utah State University (USU), expired December 30, 2016. The STEM AC, with the Board's consent, determined that it would be beneficial to the STEM AC and the evaluation of its projects to conduct a search for a new evaluator. There were numerous reasons for the decision including significant turnover in faculty and staff at USU that had the evaluation of the projects vulnerable. The STEM AC talked to other state initiatives and determined that working with multiple universities, or entities, was critical. A partnership or consortium of entities that could provide evaluation mitigated the risks of turnover and provided access to greater expertise. The STEM AC, working with State Procurement, released a Request for Proposals to search for a new evaluator. The STEM AC is now contracting with Utah Valley University (the College of Education), in partnership with the University of Utah (the Utah Education Policy Center; UEPC).

The STEM AC is working with the new evaluators to expand beyond basic metrics, such as aligning SAGE scores with one or two benchmarks for usage, to a more robust analysis that provides greater stratification of the data. The STEM AC is working with the new evaluators to look at impact in student learning with changes in teaching methodology (for the endorsement and professional learning grants). Additionally, strategies have

been considered and developed to capture information that will be used longitudinally to continue to improve projects over time. Further, the STEM AC has worked with the evaluators to create more extensive evaluation strategies which are included in the logic models that are included in the STEM AC strategic plan (Appendix H). The logic models outline the revised performance measures that will be aligned with the K-12 Math Personalized Learning program, the K-12 Personal Learning grant program and the Elementary STEM Endorsement program.

The third party evaluator has been working on the completion of a full annual report that will include assessment of the Personalized Math Learning, Professional Learning and Elementary STEM Endorsement projects. The STEM AC will provide the full annual report as an addendum once it has been submitted by the evaluator. It is anticipated that the final evaluation report will be available by mid-November, 2017.

Additional:

SB93 Computer Science Initiative - 2016 Legislative session

The SB93 activities, fiscal and programmatic, are overseen by the Utah State Board of Education (USBE); the STEM AC is involved in a limited capacity. The Computer Science Initiative is to provide incentives to current educators to earn a Computer Science endorsement. Districts may elect to use funds for professional development training for teachers, travel reimbursements for relative conferences,

conference registration fees, tuition fees, and other approved computer science related expenses. The STEM AC has been working to include links to open resources for computing (<https://stem.utah.gov/for-educators/website-resources/>) and has compiled a spreadsheet of computer science resources that are being used currently by Utah LEAs or are being supported by the STEM AC.

The STEM AC has requested a report from the USBE on the status of the SB93 grants. It will be forwarded as an addendum once is received.

ATTACHMENTS:

- Appendix A: Selected Product Providers
- Appendix B: Classroom Grants Summary
- Appendix C: ECS STEM Playbook
- Appendix D: ECS Book of the States
- Appendix E: STEM School Designation Awardees
- Appendix F: “Lessons Learned” Summary - K-12 Professional Learning program (2 pages)
- Appendix G: Professional Learning Grant Awards Summary
- Appendix H: STEM Action Center Strategic Plan
- Appendix I: “Lessons Learned” Summary – K-12 Personalized Math Learning

APPENDIX A: SELECTED PRODUCT PROVIDER LIST

Attachment A

Selected Product Provider List

HB Project	Vendor	Alignment
Math Software: Grades K-12	<ul style="list-style-type: none"> - Ascend Education (Ascend Math) - Curriculum Associates (i-Ready) - Imagine Learning (Imagine Math) - McGraw-Hill (ALEKS) - MIND Research Institute (ST Math) 	<ul style="list-style-type: none"> ✓ Contains individualized instructional support for skills and understanding of core standards ✓ Is self-adapting to respond to the needs and progress of the learner ✓ Provides opportunities for frequent, quick and informal assessments ✓ Includes an embedded progress monitoring tools and mechanisms for regular feedback to students and teachers
Professional Development Software	- School Improvement Network	<ul style="list-style-type: none"> ✓ Access to automatic tools, resources and strategies ✓ Work in online learning communities ✓ Includes video examples of highly effective STEM education teaching ✓ Covers a cross section of grade levels and subjects ✓ Includes videos of Utah STEM educators ✓ Contains tools to help implement what has been learned ✓ Allowance for face-to-face learning in a hybrid model
Applied Science (CTE) Software: Grades 7-8	<ul style="list-style-type: none"> - Pitsco - The STEM Academy - ITEEA - Project Lead the Way 	<ul style="list-style-type: none"> ✓ An applied science curriculum for students in grades 7 and 8 ✓ Includes STEM applied science curriculum with instructional materials ✓ Includes STEM hybrid or blended high quality professional development that allows for face-to-face applied learning ✓ Includes hands-on tools for STEM applied science learning.

APPENDIX B (STEM Sponsored Events)

Event	Sponsorship Amount	Number impacted (approx)	Event Location	Event Date
STEM Fun Run	\$500	500	Salt Lake Center for Science Education	8/28/16
Governor's Medals for Science and Technology	\$1,000	300	This is the Place Heritage Park	1/19/17
Utah Teachers Association	\$200	600	Utah Valley Conference Center	2/10/17
Bridgerland Applied Technology College (BATC)	\$500	4,000	BATC	5/3-4/17
Super Science and Math Night	\$500	500	Windridge Elementary School	3/3/17
Wizarding Dayz	\$1,000	5,000	South Towne Expo Center	2/24-25/17
Utah Engineers Council	\$2,500	200	Rio Tinto Stadium	2/17/17
HacktheU	\$1,500	181	University of Utah	11/11/16
Elementary Family Engineering Night	\$500	470	Thunder Ridge Elementary	10/27/16
Multicultural Youth Leadership Summit	\$100	1,700	Salt Palace Convention Center	10/3/16
Mountainland Code Camp	\$1,500	100	Xactware Solutions	3/10/17
Jump Start	\$1,000	608	Ogden Conference Center	10/8/16
Utah Regional FIRST Robotics Competition	\$1,250	250	Hillcrest High School	1/6/17
Utah STEM Envirothon Competition	\$1,500	350	Richfield High School	4/20/17
Mountainville Academy STEM Night	\$500	380	Mountainville Academy	3/22/17

Northern Utah Rube Goldberg Competition	\$1,250	300	Weber State University	10/25/17
Salt Lake City Mini Maker Faire	\$500	2,000	Utah Fair Grounds	4/15/17
PhysX	\$500	50	Utah State University	5/12/17
PTA Conference	\$115	500	Murray High School	6/8-9/17
High School Utah Entrepreneur Challenge	\$1,000	100	University of Utah	5/14/17
Comicon	\$0	50,000	Salt Palace Convention Center	03/17/17-03/18/17
STEAMed Up	\$0	500	Salt Lake City Library	11/19/16
Kids Day with the Stars	\$0	1005	Salt Lake Community College	2/8/17
Utah Council of Teachers of Mathematics Conference	\$0	300	West High School	11/4/16
Expanding Your Horizon	\$0	380	Utah Valley Convention Center	1/7/17
Northwest Middle School Career Fair	\$0	200	North West Middle School	1/19/17
DATC Career Days	\$0	1,200	Davis Applied Technology College	5/5/17
Kearns Junior High STEM Night	\$0	300	Kearns Junior High School	3/18/17
Willow Park Zoo: Dream Rocket Project	\$0	1,500	Willow Park Zoo	4/22/17
Economic Summit	\$0	900	Grand American Hotel	4/14/17
Summer Reading Program Kick Off	\$0	5,000	Viridian Center	6/2/17
Pathways to Professions	\$0	9,000	South Towne Expo Center	10/12/17-10/13/17



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A State Policymaker's STEM Playbook

JENNIFER ZINTH, EDUCATION COMMISSION OF THE STATES
AND TAMI GOETZ, UTAH STEM ACTION CENTER

Science, technology, engineering and mathematics (STEM) has captured the attention of state policymakers who are concerned about equitable

on investment because programs are missing one or more of **three essential elements**:

- **Statewide coordination or consolidation within a single statewide entity.**
- **Adequate, reliable funding from year to year.**
- **Quality assurance or program evaluation.**

This Promising Practices in Education report highlights Utah as a case study for successfully enacting and implementing legislation that assures the presence of all three of the above components. The report also identifies other elements that contributed to the passage and implementation of Utah's efforts.

In many states, STEM policymaking efforts have not achieved their intended return on investment because programs lack one or more of

3 essential elements

STATEWIDE COORDINATION, ADEQUATE FUNDING and EVALUATION.

access to high-quality educational experiences and preparing and inspiring students to pursue STEM careers. Yet in many states, STEM policymaking efforts have not achieved their intended return

In 2013, Utah passed legislation that

established the **Utah STEM Action Center**.

This legislation, and subsequent implementation processes, **assure** the **presence** of these **three essential elements**.

Additional components critical to the Utah STEM Action Center's success are **communications**, **marketing** and **positioning**; **partnerships/liasons**; and **funding**, including the establishment of a public 501(c)(3) in May 2016 - a game-changer for the Center.

Three Essential Elements

Since the early 2000s, when the STEM acronym began to gain currency in education policymaking circles, states have passed hundreds of pieces of STEM-related legislation. While the focus of these policymaking efforts has been diverse – STEM teacher recruitment, preparation and professional development; ensuring access to high-quality standards and curricula that provide real-world applications and hands-on learning experiences; increasing STEM interest and achievement among female and underrepresented minority students, to name just a few – policymakers by and large feel they have not solved the STEM issues in their state.

This is in part because all too often, state STEM policy approaches lack one or more of three essential elements:



Coordination: Statewide coordination or consolidation within a single statewide entity.



Resources: Adequate, reliable funding from year to year.



Evaluation: Quality assurance or evaluation of funded programs.

The Utah Story

Utah has taken policy action to ensure that all three of these elements are reflected in state-level STEM education initiatives. The section that follows identifies critical steps in developing and implementing the Utah STEM Action Center, in large part grouped under these three elements. This report also identifies other key considerations that supported or enhanced Utah's program adoption and implementation efforts.

The Need Is Identified for a STEM Program



Coordination

Talent demand was a key motivator for Utah to look at a K-16, even K to gray, approach to STEM education. This need for talent existed across the state and across industry sectors. To address this demand, the state would need to align education efforts with industry talent needs. Equally motivating was the fact that, while numerous STEM initiatives were being deployed across the state, these were going unnoticed because programs were not leveraging efforts and resources effectively. The state recognized that improved coordination could serve as a solution.



Coordination + Resources

Conversations around talent development with industry representatives ultimately led some state leaders to determine that state-level coordination for a state STEM initiative was needed, along with a substantial leveraging of resources, across K-12, postsecondary and business/industry.



Evaluation

Some STEM programs in Utah had been in place for 10-15 years. While data showed a sustained level of participation, very little available data demonstrated impact. Policymakers questioned whether some of these programs were a good investment.

The Idea Incubates



Coordination

Goetz, in her role as the Governor's State Science Advisor, along with Diana Suddreth, STEM Coordinator for the Utah State Office of Education, brought a small group of individuals together to spend a year exploring best practices in state STEM initiatives. This nucleus included representatives from the Utah State Office of Education, the Utah System of Higher Education, the governor's office, legislators and industry.



Resources

The group realized that the proposed STEM effort justified greater support from industry partners. Legislative funding would be needed to sustain this effort.



Other Key Considerations

Framing the initiative, and finding the right supporter. Lessons learned from successful university-level engineering initiatives pointed to three needs for the burgeoning STEM effort:

- Industry-led.
- Every successful campaign needs a passionate evangelist. This STEM evangelist needs to come from within industry, and needs to know how to navigate the legislative process and garner legislative support. The industry champion must understand, and be motivated by, a need for talent - and understand that a solid STEM education foundation leads to more talent.
- Speak the language of accountability and outcomes.

Industry partners, working through a strong and supportive technology trade organization, the Utah Technology Council, united on a campaign to collaborate with legislators to champion the creation of a state STEM initiative. Industry backing, along with a substantial leveraging of resources across K-12, postsecondary and business/industry, was the tipping point for real action.

Differentiating from existing initiatives. The group saw the need to clearly differentiate the work of the Utah STEM Action Center from that of the Utah State Office of Education. The Utah STEM Action Center would drive research and development (R+D). Conducting intensive third party evaluation of programs and ongoing program oversight and monitoring, including professional development and supplemental education programs, is outside the mission of the state office of education. The Utah STEM Action Center would work in synergy with, but separate from, the state office of education. This is viewed by both parties as a truly equitable partnership.

R&D?



Utah districts were already purchasing supplemental math learning tools. However, districts do not have the time or capacity to research whether the products they are considering will achieve the desired outcomes. As a result, districts may decide to purchase supplemental math products based on cost or other factors beyond the quality of the product or its alignment with the specific challenges within the district.

Enter the Utah STEM Action Center. The Center can test a wide variety of products, targeting a wide variety of students, including English learners who may struggle with reading. Based on this research, the Utah STEM Action Center can provide a menu of options districts can choose from, based on local challenges. For example, a district serving a large immigrant population can choose products tailored to their needs. If a district decides a product is not meeting their needs, they can trade it in to the Utah STEM Action Center for a more suitable product, and not continue to use a product they may have purchased due to limiting factors such as affordability.

Embarking on the Legislative Process

Once a state decides to move forward with the creation and funding of a statewide STEM coordinating entity, policymakers should consider the challenges Utah leaders faced.

Location

Where would the Utah STEM Action Center be housed? The notion of establishing it within a single postsecondary institution was set aside, as the vision of the Utah STEM Action Center as an agnostic agency working with all governmental entities and agencies in the state would be compromised if the Center were perceived as being owned by a single institution.

The same argument was used against locating the Utah STEM Action Center within a single school district. What is more, housing such an entity went beyond the mission of a local education agency.

Further concerns dissuaded decision-makers from placing the initiative within the state office of education. Beyond conducting R+D on existing efforts, the Utah STEM Action Center would serve as an innovative space. According to Clayton Christianson's **disruptive innovation model**, if the new entity did not focus its efforts on innovation, the innovation component would cease to exist and the entity would be subsumed into the agency within which it was housed. Nevertheless, while not situated in the state office of education, the Utah STEM Action Center and state office of education would work in close partnership in the planning, implementation and evaluation of all K-12 programs.

The final decision was to place the Center in the Governor's Office of Economic Development. This co-location represented a neutral placement that would allow the Center to serve all education partners. The alignment of the Center's education and talent development efforts with economic development was seen as beneficial.

Funding

An endeavor that coordinates various STEM activities including R+D and evaluation activities, among K-12, higher education and workforce/industry, can only fulfill its mission with substantial financial support for grants and staff. Since 2013, the Utah STEM Action Center has received a combination of one-time and on-going funding via three appropriations spanning four fiscal years, totaling \$23.5 million in one-time and \$23.6 million in ongoing funding. The ongoing funding supports both operational functions (\$1.5 million annually, and following the 2016 session, \$3 million to support a math program) and programs. The Center received these appropriations from the general fund and not the education fund.

What Is the Utah STEM Action Center?

Statutes pertaining to the Utah STEM Action Center are in the section of Utah Code governing the Governor's Office of Economic Development.

Per **U.C.A. § 63N-12-203**, the Center is governed by the Utah **STEM Action Center Board**, which includes various representatives of K-12, higher education, government and business.

Broadly speaking, statute directs the Utah STEM Action Center and its board, under the leadership of a director appointed by the board, to fulfill a variety of functions. Many of the functions of the Utah STEM Action Center, its board and executive director relate to these critical elements of coordination, evaluation and resources.

The section that follows identifies statutory duties and powers assigned to the Utah STEM Action Center board, executive director and the Utah STEM Action Center, as well as other key considerations a state should be mindful of in developing the duties and powers of a similar statewide entity.

Coordination

The Utah STEM Action Center board is directed by **statute** to:

- Establish a STEM Action Center to:
 - ✓ Coordinate STEM activities among various K-12 and higher education stakeholders at the state and local level.
 - ✓ Align K-12 and higher education STEM activities.
 - ✓ **Create and coordinate best practices among K-12 and higher education.**
- Strategically engage industry and business entities to cooperate with the board to support high-quality professional development and provide other assistance to educators and students.¹

As funding allows, the Utah STEM Action Center board is additionally directed to:

- Work cooperatively with the state board of education to further STEM education.
- Work cooperatively with stakeholders to support and promote activities that align STEM education and training activities with the employment needs of Utah business and industry.²

Evaluation

As funding allows, the director of the Utah STEM Action Center must:

- Ensure that the Utah STEM Action Center acts as a research and development center for STEM education through a request for proposals process described in **63N-12-206**.

STEM Action Center Board Members

- Six private sector members who represent business, appointed by the governor.
- The state superintendent of instruction*.
- Member of the state board of education, chosen by the board chair.
- The commissioner of higher education*.
- The executive director of the governor's office of economic development*.
- The executive director of the department of workforce services*.
- The Utah College of Applied Technology commissioner of technical education*.
- One member appointed by the governor.
- One member with a degree in engineering and experience working in a government military installation, appointed by the governor.

*indicates where designee may take the place of an official

- Review and acquire STEM education related materials and products for
 - ✓ High-quality professional development.
 - ✓ Assessment, data collection, analysis and reporting.
 - ✓ Public school instruction.
- Identify at least 10 best practice innovations used in Utah that have resulted in a measurable improvement in STEM student performance or outcomes.
- Identify best practices being used outside Utah and, as appropriate, develop and implement selected practices through a pilot program.
- Identify kindergarten-sixth grade and seventh-12th grade learning tools identified as best practices.
- Collect data on Utah best practices, including from K-12, higher education, the Utah Education and Telehealth Network and other STEM-related entities.
- Keep track of how the best practices data are being used, and how many individuals are using the data, including the demographics of the users, if available.
- Support best methods of high quality K-12 STEM professional development, including methods that reduce cost and increase effectiveness, to help educators learn how to most effectively implement best practice learning tools in the classroom.³

Importantly, statute also directs the Utah STEM Action Center director, as funding permits, to work with an independent evaluator to track and compare performance of students participating in a Utah STEM Action Center program to all other similarly situated Utah students in terms of:

- High school graduation rates.
- The number of students taking a remedial math course at a state institution of higher education.
- The number of Utah public high school graduates who begin a postsecondary education program.
- The number of students, compared to all similarly situated students, who are performing at grade level in STEM classes.⁴

The Utah STEM Action Center board is directed by statute to work to meet the following expectations:

- That at least 50 educators are implementing best practice learning tools in classrooms.
- Performance change in student achievement in each classroom participating in a Utah STEM Action Center project.⁵ In practice, this has taken the form of assessing student achievement via metrics, where appropriate, specific to each project. For example, with the math tools project, proficiency

gains on end-of-year test scores are analyzed. For the STEM certification program, completion and acquisition of an identified credential is considered as student achievement. For the applied science project, student pre- and post-surveys, and teacher observations are used.

As funding allows, the board must also work cooperatively with the state board of education to ensure best practices are implemented as relates to the STEM education-related instructional technology program described in **63N-12-206** and distribution of STEM education instructional technology to schools as described in **63N-12-207**.⁶

Resources

The Utah STEM Action Center board is directed by statute to strategically engage industry and business entities to cooperate with the board in providing private funding and support to the Utah STEM Action Center.⁷

Statute authorizes the board to establish a foundation to assist in:

- The development and implementation of the programs authorized by statute to promote STEM education.
- Implementation of other STEM education objectives described in statute.⁸

As funding allows, the board must also engage private entities to provide financial support or employee time for STEM activities in schools, in addition to what is currently provided by private entities.⁹

Other key considerations

The Utah STEM Action Center is also directed by statute to perform various functions related to engaging students, educators, private sector representatives and others in a number of activities.

Additional Components Critical to the Center's Positive Impact

Goetz of the Utah STEM Action Center identifies these interrelated elements that, while not necessarily established in legislation, have also been critical to the Center's positive impact.

Communications, Marketing and Positioning

Utah STEM Action Center as megaphone and center of convergence

The Utah STEM Action Center functions as a megaphone - a statewide mode of communication for stakeholders and communities to learn about STEM activities in Utah. Inversely, the Utah STEM Action Center is also outward-looking, an entity to which individuals can take a STEM issue or idea, because something will come of it.

In other words, "action" is integral to the Utah STEM Action Center's name. The Center is not just a repository or clearinghouse of information, but active in the sense of communicating STEM events, and connecting individuals with resources.

What is it you do ... do?

Quoting Madeline Kahn's line from the film *Young Frankenstein*, a state developing its own STEM action center needs to determine at the outset what kind of programs it will be operating. STEM action center-supported programs must be impactful; they must make a difference for students, educators, industry and parents. Students learn to do STEM, think with STEM and solve with STEM. Programs ensure that educators have the ability to make STEM come to life in the classroom.

Programs are a part of the function of the center. But is that all? Will it be convening? Facilitating dialogue? Writing and receiving grants? Seeking legislative funding to establish programs that require reporting, monitoring or contracting? How will the targets of its programs be identified? The first few projects of the Utah STEM Action Center came about from a combined interest of legislators and education partners. However, more recent projects are a result of considerable industry input.

The key role of industry, the importance of workforce alignment

It is critical that the Utah STEM Action Center develop and clearly articulate its workforce alignment component. Industry partners are not only essential to securing financial support, but also to guiding workforce alignment strategy. The Utah STEM Action Center should ideally serve as a nerve center, helping to support economic development efforts, helping Utah companies grow other Utah companies.

As Tami Goetz phrases it, "There is life after credentials." In other words, the Utah STEM Action Center must be intentional about extending its focus beyond STEM education and serve a role after credential attainment, specifically workforce development or talent alignment/talent development. Industry must play a pivotal role in aligning STEM education efforts with the broader goals of workforce/talent development.

Marketing and branding

While coordination with business and industry is important, marketing and branding are also essential in creating a brand for STEM in Utah. Initially, the Utah STEM Action Center used the governor's marketing and communications staff for this work. However, the Utah STEM Action Center staff soon realized it needed its own marketing staff member, with the experience to savvily target different messages to a diverse set of STEM stakeholders with very different agendas – K-12 educators, legislators and CEOs, among others.

Legislative communication strategy

Early on in the process of implementing a center modeled after the Utah STEM Action Center, it is important for states to develop a legislative communication strategy. This is an iterative process that considers which legislators a STEM center should coordinate with on specific committees, which legislators may be skeptical on a certain issue the STEM center is in favor of, etc.

Partnerships and liaisons

Partnerships are essential to the Utah STEM Action Center's coordination with other state agencies. To ensure the Utah STEM Action Center's strategic plan develops or builds upon work of other agencies – and, alternatively, does not create gaps or duplicate efforts – the Utah Action Center utilizes liaisons who work part-time for the

Utah STEM Action Center and part-time for another state agency. The Center currently employs three liaisons, one each with the Utah Department of Workforce Services, Governor's Office of Economic Development and Utah State Office of Education. These positions, funded by the Utah STEM Action Center, as well as the state agency they liaise with, also share responsibility for the portion of the STEM Action Center strategic plan they are responsible for that year. Liaisons bring more depth to the Utah STEM Action Center's work, but for half the cost and allow the Center to ensure that its work aligns with workforce needs.

Funding

Diverse funding portfolio

There is value in portfolio diversification. An initiative such as the Utah STEM Action Center cannot exist without substantive and reliable legislative funding, and private donations also provide critical funds. Yet, the establishment of a public 501(c)(3) in May 2016 has also been a game-changer for the Utah STEM Action Center, particularly in how the entity is viewed by corporate donors.



Endnotes

1. U.C.A. § 63N-12-204(1)(a), (d)
2. U.C.A. § 63N-12-205(1)(c)(i), (e)
3. U.C.A. § 63N-12-205(2)(b), (c), (g)-(k), (n)
4. U.C.A. § 63N-12-205(4)(a)
5. U.C.A. § 63N-12-204(1)(f)(i), (ii)
6. U.C.A. § 63N-12-205(1)(c)(ii)
7. U.C.A. § 63N-12-204(1)(d)
8. U.C.A. § 63N-12-204(3)
9. U.C.A. § 63N-12-205(1)(d)

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All Sy-STEMs a Go: States Leveraging Best Practices and Public-Private Partnerships to Advance STEM Education

By Jennifer Zinth

While STEM education has captured policymakers' attention, few states have taken a systemic approach to STEM policymaking to ensure program coordination, reach, sustainability and return on investment. However, a few states have taken strides to establish statewide coordination, adequate and reliable funding, and evaluation. Those states have demonstrated results, including increased recruitment of female and minority students. Public-private partnerships and structures to formalize the role of business and industry in developing and implementing STEM programs are additional means to enhance these efforts and ensure alignment with employment trends.

State-level policymaking in science, technology, engineering and mathematics, or STEM, education faces a challenge. The challenge is not a deficit of attention—on the contrary, many states have passed several pieces of STEM legislation and approved numerous STEM initiatives over the last decade. Nor is the challenge a lack of ideas—policymakers have acted on many facets of STEM education, impacting educators and students alike, from the early grades through postsecondary. The challenge, rather, is that all too often, states lack a systemic approach to STEM policymaking. The result? A state policy landscape littered with well-intentioned, yet uncoordinated, and frequently underfunded state activities, with little to no data demonstrating the impact of these efforts.

What does a systemic state approach to STEM policymaking entail? After an examination of STEM efforts across states, three critical—and interrelated—elements of a cohesive strategy emerge:

- **Statewide coordination:** Efforts are well-coordinated across agencies, or housed within a single state entity, with representation and buy-in across stakeholder groups (higher education, K–12, informal, nonprofit, local and state government, business and economic development, etc.).
- **Adequate, reliable funding:** States have committed adequate funding to assure broad, statewide reach of efforts across multiple years, and included funds to support one or more dedicated full-time employees, FTEs, to implement and evaluate efforts.
- **Quality assurance:** Reliable data are collected and analyzed to evaluate the return on investment of state efforts, and make course corrections as needed.

Many states are lacking at least one of these elements, if not two or all three. However, it is also clear that states need not fit a mold to effectively integrate these three elements in state STEM decision-making. States as diverse in their demographics and policymaking approaches as Iowa, Massachusetts and Utah have all demonstrated that students win when states take a systemic approach to STEM policymaking.

Massachusetts' STEM work is currently led by the STEM Advisory Council, established in its current form in 2009 and supported by the Executive Office of Education and three state agencies administering early learning, K–12, and higher education/workforce. Codified in statute in 2015, the Advisory Council is charged with coordinating STEM efforts across the public and private sectors, and more broadly leveraging its members and resources to accelerate the adoption of high-quality STEM education across the commonwealth.

Regional councils, called Regional STEM Networks, initially launched and funded in 2003–04, play a key role in bringing together diverse stakeholders in local communities to address regional priorities aligned with state goals. Overseen by a program manager at the Department of Higher Education, and closely aligned to the state's STEM Advisory Council, the networks are housed in a postsecondary institution or a regional employment board. In 2017, regional network grants included incentives for cross-regional collaboration and alignment of work with the STEM Advisory Council's current priorities of enhancing work-based learning opportunities in STEM fields, early college career pathways, and access to high-quality engineering and computer science education.

The STEM Advisory Council draws primarily upon the STEM Pipeline Fund to fund initiatives aligned with its priorities. Developed by the legislature in 2003, the STEM Pipeline Fund has received sizable legislative appropriations in recent years—including \$1.5 million in 2012 and each year thereafter—to fund initiatives tied to the STEM Advisory Council’s priorities, including the regional networks and the state’s STEM Summit. In March 2017, Massachusetts Lt. Gov. Karyn Polito, a co-chair of the STEM Advisory Council, announced a \$1 million public-private grant to 45 schools to adopt Project Lead the Way curriculum. The STEM Advisory Council has also prioritized increasing the number of employers who offer STEM-focused internships to high school students and has leveraged its funding to support outreach to executives across the state.

Iowa Gov. Terry Branstad and Lt. Gov. Kim Reynolds have truly been a driving force in bringing coordination, consistent funding and quality assurance to their state’s STEM efforts. Just six months after his January 2011 return to Iowa’s executive office, Gov. Branstad issued an executive order creating the Iowa Governor’s STEM Advisory Council. The STEM Advisory Council, co-chaired by Lt. Gov. Reynolds and president and CEO of Kemin Industries Chris Nelson, and staffed by 4.5 FTEs housed in the University of Northern Iowa, coordinates a diverse array of STEM efforts, including STEM Scale-Up (expansion of preK–12 programs in computer science, engineering, physics, etc.), school-business partnerships called STEM BEST® (Businesses Engaging Students and Teachers), and STEM teacher externships in industry, to name just a few. To ensure regional voice in the council’s efforts and oversee local implementation, the council has split the state into six STEM regions, and cost-shared the staffing in each location with one regional STEM manager, in partnership with higher education institutional “hubs.”

Beyond funding for FTEs to support state and regional coordination, Iowa has brought significant resources to bear on developing and implementing high-quality STEM programs. For example, since 2012 the legislature has approved an appropriation (\$4.7 million in 2012, increased to \$5.2 million in 2014 and steady since) to support the STEM collaborative initiative, which supports preK–12 STEM programming, K–12 STEM teacher licensure and professional development, STEM college and career promotion, community engagement

and public awareness, and assessment and reporting. Iowa’s STEM efforts are also supported to some extent by state and federal grants, as well as private funds, but state funds remain at the core.

The state ensures, however, that programs funded through the Governor’s STEM Advisory Council are showing results. For example, the STEM Scale-Up Program establishes a menu of programs annually approved by the Governor’s STEM Advisory Council that applicant educators may offer. Annual STEM evaluation reports use teacher/leader surveys and student math and science assessment results to gauge the extent to which funded programs are enhancing interest, awareness and achievement in STEM.

Meanwhile, Utah launched its STEM efforts through the General Assembly, taking a slightly different approach to statewide coordination, funding and quality assurance. With strong backing from industry, 2013 legislation established the Utah STEM Action Center in the Governor’s Office of Economic Development. The STEM Action Center, governed by a board and under the leadership of an executive director, is charged with developing and implementing numerous STEM initiatives, including K–12 digital math programs, an Elementary STEM Endorsement and a recently funded kindergarten through post-secondary, K–16. Computing Partnership grant program, among others. The STEM Action Center is staffed by six FTEs, which includes a part-time foundation director, and three FTEs for the Utah STEM Bus funded by a grant. Statewide coordination is further supported by three liaisons who work part-time for the STEM Action Center and part-time for another state agency (Utah Department of Workforce Services, Governor’s Office of Economic Development and Utah State Board of Education). Liaison positions are jointly funded by the Utah STEM Action Center and the state agency they liaise with.

From 2013 to 2016, the Utah STEM Action Center has received a combination of one-time and on-going funding via three appropriations spanning four fiscal years, totaling \$23.5 million in one-time, and \$14.5 million in ongoing funding. The ongoing funding supports both operational functions and programs (\$1.5 million annually, and following the 2016 session, \$3 million to support a math program). A K–16 Computing Partnership grant program was recently funded in the 2017 legislative session for \$1.255 million annually. In addition, statute calls upon the STEM Action Center

board to strategically engage industry and business entities to cooperate with the board to provide private funding and support for the STEM Action Center. The law authorizes the board to establish a foundation with an endowment to assist in program development and implementation.

Utah statute requires the STEM Action Center director to conduct a variety of activities to identify best practices, and keep track of how best practices data are being used and who's using the data. By statute, the director must work with an independent evaluator to compare outcomes of STEM Action Center program participants to those of other students, on STEM and broader indicators.

Readers may be wondering how all this statewide coordination, funding, and quality assurance translates into increasing STEM interest and achievement for female and underrepresented minority students. Program outcomes data from all three states bear witness to positive impacts for these very students.

Iowa's extensive evaluation data indicate their investments are moving the needle for underrepresented students. For example, the 2015–16 evaluation report from the Governor's STEM Advisory Council notes that from 2011 to 2015, the largest proportional increase of high school students who aspired to a STEM bachelor's degree "was among students who were African American, with those aspiring to a bachelor's degree rising from 38 percent in 2011 to 47 percent in 2014. Among Hispanic students the proportion aspiring to a bachelor's degree increased from 46 percent in 2011 to 55 percent in 2015." Just from 2012–2013 to 2013–2014 alone, the number of females graduating with degrees in STEM fields at Iowa's four-year public universities increased 16 percent.¹

Alternatively, one of Massachusetts' cornerstone STEM programs, the STEM Starter Academy, is targeted at increasing STEM success for more diverse students. Specifically, the goals of the STEM Starter Academy are to recruit more students, particularly diverse students, into STEM community college programs, and increase the number of STEM certificate and degree completers prepared to enter the workforce or transfer into a four-year STEM program. The latest program evaluation published in January 2016 shows encouraging results. STEM Starter Academy students reflect the racial and ethnic diversity of the overall community college population in the state. Seventy percent of STEM Starter Academy participants who have earned certificates and degrees

so far have done so in STEM fields, compared to 45 percent of the below-baccalaureate certificates and degrees earned statewide. And year one to year two retention rates for participants were slightly higher than for all full-time, first-time degree-seeking community college students.

Meanwhile, Utah has collaborated with the National Alliance for Partnerships in Equity in a federal STEM Equity Pipeline grant. A three-year pilot with one district resulted in dramatic increases in enrollments of girls in engineering and robotics classes. The STEM Action Center is scaling the root cause analysis work to two additional districts.

Beyond having appropriate structures in place to ensure program coordination, provide adequate and reliable funding and evaluate impact, states, regional employers and students also reap the benefits when programs are aligned with industry. States have taken various approaches to improving this alignment, including public-private partnerships, and structures to incent or require state or regional collaboration between K-12, higher education and business/industry partners.

Public-private partnerships take diverse forms across the states. The Massachusetts General Assembly, for example, appropriated \$1.7 million in both 2015 and 2016 for public-private dollar-for-dollar match of funds supporting computer science education in public schools. Florida House Bill 5001 passed in 2016 made a \$4.5 million appropriation to provide matching funds to school district education foundations for private funds received for various types of programs, including STEM initiatives.

And as some state STEM leaders are quick to point out, a valuable public-private partnership doesn't always mean someone needs to write a check. For example, Iowa's Governor's STEM Advisory Council website notes that businesses can support STEM through such programs as "Experienced STEM Professional" (lending STEM expertise through student internships, teacher externships, mentorships and other avenues), "STEM Resource" (including donations of materials, equipment and grant-writing support) and "STEM Supporter" (being a voice on behalf of STEM education, such as through commentaries in the press, testimonials and written support to local decision-makers and community organizations, presence in community events, etc.)

States have likewise adopted various programs to give industry a seat at the table in designing and implementing STEM programs. Most commonly,

state approaches either support and incent localized programs via competitive grants to education and business partners, or establish a state-level structure for industry leaders to inform STEM program development and implementation.

One example of a successful localized partnership approach is Iowa's Businesses Engaging Teachers and Students, or STEM BEST, launched in 2014. Under the model, the Iowa STEM Advisory Council applies a rigorous vetting process to award grants to applicant education/business partnerships to improve connections between STEM learning and in-demand STEM careers in the state. Grant funds underwrite curriculum development, teaching training and equipment purchases. Grant awards in 2016 impacted students across the state from the early grades through high school, and include virtual reality STEM career exploration, project-based learning, and potential work-based learning opportunities such as job shadows, internships and pre-apprenticeship programs.

Since 2009 the Utah Cluster Acceleration Partnership has provided grants to applicant education and business partnerships to develop new programs or increase the capacity of existing programs to address unmet workforce demand. Housed in the state Department of Workforce Services, the department partners with the Utah System of Higher Education and the Governor's Office of Economic Development to approve programs in growing Utah industries, including STEM fields such as computer science/IT and advanced manufacturing. Grants support individual schools or school districts in the development, implementation or redesign of career pathways linking students to higher education, as well as public postsecondary institutions designing, implementing or retooling programs to serve regional or state industry needs.

In March 2017, Utah Gov. Gary Herbert announced that the Utah Cluster Acceleration Partnership will become the Talent Ready Utah grant program with over \$2.1 million for education/business partnerships targeted at filling demand in high-growth industries and occupations. Fiscal Year 2018 grants are intended to increase attainment of industry-recognized credentials, design career pathways with multiple entrance and exit points, and "create systemic change that will last beyond the grant period by establishing partnerships, agreements, processes, and programs that better connect education, training, workforce, and employers to meet industry needs within the re-

gional economy."² Utah Senate Bill 190 passed in 2017 also incentivizes districts and public schools to collaborate with state level partners, Talent Ready Utah and the STEM Action Center among them, in developing and implementing comprehensive K-16 computing partnerships.

Turning from localized to state-level partnerships, it's worth noting that many state-level vehicles allowing industry leaders to inform STEM program development and implementation have been launched through legislation. In just one example, Colorado House Bill 1274 passed in 2015 tasked the Colorado Workforce Development Council to collaborate with specified partners to develop integrated career pathways in construction and related skilled trades, IT and health care. The measure directs the council and partners to apply the same template, and any improvements to the model based on implementation, that Colorado used in response to a 2013 legislative mandate to develop the manufacturing career pathway. House Bill 1274 passed in 2015 also directed industry, through regional sector partnerships, and statewide trade associations to annually review each career pathway to ensure it maintains relevance, and provide input for changes to better align with workforce needs.

As computer science has picked up steam in statehouses across the country, legislators and other key decision-makers have seized upon task forces and similar entities as vehicles to ensure industry voice in the development of computer science standards (including in Arkansas, a national leader in the computer science education movement), as well as recommendations to address numerous other issues related to ensuring equitable access to high-quality computer science instruction, in California, Illinois and South Carolina, for example. Establishment of such state-level entities to guide policy development is a step in the right direction, as noted in the landmark 2017 State of the States Landscape Report on computer science. One of the report's three cross-cutting recommendations for action is for states to "Build a broad base of leadership and ownership among key stakeholders," including business and industry.

Lastly, state STEM advisory councils have historically included substantial business representation. While councils in many states have waxed and waned with turnover in the state leaders who have created them, they can play an important if underutilized role in ensuring the state return on investment in STEM education. One state that has

made promising strides in fulfilling the promise of industry involvement in its STEM advisory council is Michigan. Created by House Bill 4115 in 2015, the 11 gubernatorial appointees of the 15-member council must include representatives of business sectors that are important to Michigan's economy and rely on a STEM-educated workforce, among other stakeholders. Among the charges to the council is to provide quality assurance of state-funded programs, including by using Change the Equation's rating system program.

Notes

¹Iowa Governor's STEM Advisory Council, 2015–2016 Iowa STEM Evaluation Report, August 2016.

²Utah Department of Workforce Services, "Talent Ready Utah Grant FY18," n.d.

About the Author

Jennifer Zinth is the director, high school and STEM, at Education Commission of the States in Denver, Colorado. In her role, she provides unbiased research, analysis and counsel to state policymakers and agency staff across role groups across the 50 states.

APPENDIX E (STEM DESIGNATED SCHOOLS)

Name of School	District or Charter	Level Awarded	Year Awarded	Year Expires
Green Acres Elementary	Weber School District	Bronze	2015-2016	Summer 2020
Foothill Elementary	Alpine School District	Platinum	2016-2017	Summer 2020
Manila Elementary School	Alpine School District	Silver	2015-2016	Summer 2020
Rocky Mountain Elementary	Alpine School District	DLI	2015-2016	Summer 2020
Summit Elementary	Cache County School District	DLI	2015-2016	Summer 2020
Sunrise Elementary	Cache County School District	DLI	2015-2016	Summer 2020
Draper Park Middle School	Canyons School District	Bronze	2015-2016	Summer 2020
Union Middle School	Canyons School District	Bronze	2015-2016	Summer 2020
Mount Jordan Middle School	Canyons School District	Bronze	2015-2016	Summer 2020
Creekview Elementary	Carbon School District	Gold	2016-2017	Summer 2021
Beehive Science and Technology Academy	Charter	Platinum	2015-2016	Summer 2020
DaVinci Academy	Charter	Gold	2015-2016	Summer 2020
Utah Virtual Academy	Charter	Silver	2016-2017	Summer 2021
Mountainville Academy	Charter	Silver	2015-2016	Summer 2020
Quest Academy	Charter	Silver	2015-2016	Summer 2020
Itineris Early College High School	Charter	Bronze	2015-2016	Summer 2020
George Washington Academy	Charter	Bronze	2016-2017	Summer 2021
Utah County Academy of Sciences (UCAS)	Charter	Bronze	2015-2016	Summer 2020
Summit Academy	Charter	DLI	2015-2016	Summer 2020
Endeavour Elementary	Davis School District	Platinum	2016-2017	Summer 2021
West Point Elementary	Davis School District	Silver	2015-2016	Summer 2020
Samuel Morgan Elementary	Davis School District	DLI	2015-2016	Summer 2020
Foxboro Elementary	Davis School District	DLI	2015-2016	Summer 2020
Odyssey Elementary	Davis School District	DLI	2015-2016	Summer 2020
Neil Armstrong Academy	Granite School District	Gold	2015-2016	Summer 2020
Bluffdale Elementary	Jordan School District	DLI	2015-2016	Summer 2020
Woodruff Elementary	Logan City School District	Gold	2015-2016	Summer 2020
Hillcrest Elementary	Logan City School District	DLI	2015-2016	Summer 2020
New Bridge School	Ogden School District	Platinum	2016-2017	Summer 2021
Westridge Elementary	Provo City School District	Gold	2016-2017	Summer 2021
Lakeview Elementary	Provo City School District	DLI	2015-2016	Summer 2020
Willow Elementary	Tooele School District	Gold	2016-2017	Summer 2021
Overlake Elementary	Tooele School District	Silver	2015-2016	Summer 2020
West Elementary	Tooele School District	DLI	2015-2016	Summer 2020
Sterling Elementary	Tooele School District	DLI	2015-2016	Summer 2020
Crimson View Elementary	Washington County School District	Platinum	2015-2016	Summer 2020
Hurricane Elementary	Washington County School District	Gold	2015-2016	Summer 2020
Sunset Elementary	Washington County School District	Bronze	2015-2016	Summer 2020

APPENDIX F: LESSONS LEARNED PRO LEARNING

Year 1 14-15			Year 2 15-16			Year 3 16-17					
Issues	Corrective Actions	Tracking	Issues	Corrective Actions	Tracking	Issues	Corrective Actions	Tracking			
Contract was not negotiated and signed until December 2014	A 5 year contract was written for this product. The amount of license requested each year determines the annual award amount, therefore the award amount will vary by year		Schools had issues uploading videos	SINET promised greater technical support to teachers in year 3	STEM AC will closely monitor this from day one in year 3	By 9/30/16 some licenses had still not been distributed	user lists will be due by end of June to make sure accounts are created before the start of school	all users were identified with accounts before the start of the school year			
The application a brand new and provided minimal information. Schools were asked to provide the total number of licenses without a sound implementation approach	Detailed action plans were created between SINET and school administrators for quality implementation.		Evaluators received teacher videos via an emailed link. Video could only be accessed the first time the link was clicked, and there was no way to match videos to teachers, so changes in teacher practice could not be assessed via submitted videos. SINET as never able to find the missing videos and this part of the evaluation did not take place	SINET promises to resolve these issues and provide evidence that their product is working as intended	Videos will be shared with evaluators through a different document, not via the Edivate platform.	By 9/30/16 STEM AC received notice that some LEA trainings weren't scheduled until the end of November	All initial trainings must be scheduled by the end of August and take place prior to the end of October. Less than 40 users are new users for the 17-18 school year.	This change was successful.			
Distribution of license was a slow process and scheduling trainings was an arduous task given the time frame.			At the end of the year, when all data was reported by SINET, usage was very low	STEM AC worked with SINET and all participating LEAs to create detailed implementation plans, also set minimum usage requirements for license purchased by STEM AC	STEM AC will monitor usage closely from the start of the school year for the 16-17 school year	Inability to track the viewing of user-uploaded content	Kerry Day from SINET was tasked with researching this solution. It was determined they did not have the capability to do this within the Edivate platform.	Edivate review platform was remodeled and all users must be trained on how to use it. This must be done by the end of October 2017 for users in the 17-18 school year.			
						Low teacher buy in with one-year plans in place	in 17-18 school year offer option of 3 year funding plans	half of applications submitted in spring 17 were for 3 year funding options			

Year 1 14-15			Year 2 15-16			Year 3 16-17					
Issues	Corrective Actions	Tracking	Issues	Corrective Actions	Tracking	Issues	Corrective Actions	Tracking			
						schools with low usage were not addressed in a timely manner	SINET and STEM AC need to divide and conquer when it comes to meeting with schools with low usage to address any underlying problems	for the 17-18 school year, bi-weekly meetings were scheduled before the start of the school year with STEMAC and Edviate PSM to discuss struggling projects and address support needs			
						Edviate does not work for all LEAs- for some districts, specifically larger ones, a different platform would be more appropriate	for the 17-18 school year, LEAs will not be required to use Edviate, though STEMAC dollars cannot be used for purchasing other product licenses.	half of the received applications for next school year include Edviate licenses, totaling ~2500 licenses purchased instead of the almost 8000 purchased the prior year			
						Communication with STEM and SINET is inconsistent and unclear regularly	complete SINET "Boot Camp" with project leadership from both agencies, create detailed communication plan with defined points of contact for varying issues.	changes to staffing continue to make this a challenge, all communication is going through SINET PSM at this time, who then passes information to whoever it should go to.			
						Usage at the end of the year was much better, but still have non users	license not used for a consecutive 60 days will be reallocated in the future				

APPENDIX G: PROFESSIONAL LEARNING GRANT SUMMARY

School/LEA	Edivate Licenses	FY18 Allocated Costs (not including Edivate licenses)
Alpine Apollo Project	0	\$530,000.00
Alpine Elementary Science	0	\$245,000.00
Alpine Secondary Science	0	\$85,000.00
American International School of Utah (AISU)	0	\$12,000.00
Beehive Academy	22	\$20,000.00
Cache	0	\$100,000.00
Canyon Grove	15	\$12,400.00
Canyons Middle and High Schools	0	\$87,000.00
Carbon- Creekview Elementary	0	\$5,000.00
Channing Hall	53	\$67,000.00
City Academy	20	\$6,000.00
CUES	0	\$46,000.00
DaVinci Academy	40	\$16,500.00
Davis Elementary Schools (EBIS)	150	\$285,000.00
Davis Elementary Math	0	\$64,500.00
Davis Jr High Math	0	\$23,500.00
Davis New Secondary Teachers	125	\$140,000.00
Davis North Layton Jr and West Point Jr	0	\$75,000.00
Davis Integrated STEM	26	\$29,000.00
Davis District- Science	0	\$56,500.00
DLI STEM Schools	0	\$15,500.00
Early Light Charter Consortium	30	\$29,000.00
George Washington Academy	16	\$15,000.00
Granite District-Math	18	\$16,000.00
Granite District-Science	58	\$42,000.00
John Hancock	10	\$6,000.00
Jordan- Rosamond Elementary	0	\$4,000.00
Jordan- Rose Creek Elementary	0	\$44,000.00
Jordan School District-Science	0	\$75,000.00
Millard School District	50	\$30,000.00
Morgan School District	140	\$25,000.00
Mountainville Academy	42	\$33,000.00
Nebo School District	200	\$55,000.00
Noah Webster	37	\$0.00

Ogden Jr high, High School	0	\$120,000.00
Ogden- New Bridge Elementary	0	\$21,000.00
Park City School District	0	\$14,500.00
Piute School District	35	\$37,500.00
Providence Hall	120	\$12,000.00
Provo School District	165	\$315,000.00
Provo- Westridge Elementary	0	\$10,000.00
Rockwell Charter High School	30	\$5,000.00
Salt Lake City School District-Math	0	\$100,000.00
Salt Lake City School District-Science	0	\$49,000.00
San Juan School District	120	\$0.00
San Juan- Science	0	\$36,000.00
South Sanpete School District	75	\$177,000.00
South Summit School District	103	\$75,000.00
Spectrum Academy	25	\$40,000.00
Summit Academy	160	\$115,000.00
Uintah School District	55	\$36,000.00
Utah Virtual Academy	80	\$0.00
Washington- Crimson View Elementary	0	\$11,500.00
Washington- Math	0	\$28,000.00
Washington-Science	0	\$82,000.00
Wayne School District	40	\$29,000.00
Weber School District	0	\$225,000.00
Weilenmann	40	\$30,000.00

APPENDIX H: STEM STRATEGIC PLAN

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Format for Agency Strategic Plan

- 01. Objective**
- S1. Strategy
 - A1. Action
 - A2. Action
 - M1. Metrics that measure all actions above are aligned
 - S2. Strategy
 - A1. Action
 - M1. Metrics that measure a specific action are indented
 - A2. Action

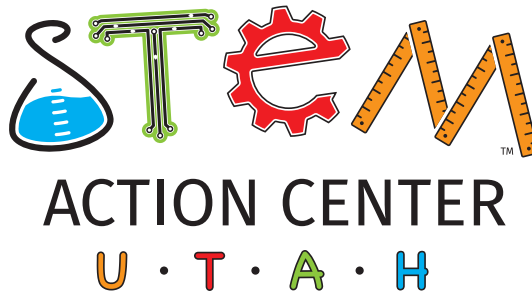


STEM Action Center Vision:

Produce a STEM-competitive workforce to ensure Utah's continued economic success in the global marketplace.

STEM Action Center Mission:

The STEM Action Center is Utah's leader in promoting science, technology, engineering and math through best practices in education to ensure connection with industry and Utah's long-term economic prosperity.



Executive Summary

- Science, Technology, Engineering, and Mathematics (STEM) careers are critical to Utah's continued economic competitiveness due to their direct ties to innovation, economic growth, and productivity. The State of Utah has responded to widespread concerns regarding the creation of STEM talent to ensure Utah's continued economic success in the global marketplace.
- Utah's talent gets diverted out of the STEM pipeline at three key times; high school graduation to matriculation, graduation from post-secondary education, and entry to the workforce. Additionally, women and minorities continue to be under-represented.
- Utah's industry requires talent with a core set of cognitive capabilities, which includes practical, hands-on AND problem solving as well as technical skills sets. *"Content, processing, and problem solving skills."*
- STEM fields provide Utah students with earning advantages at *every level* of educational attainment and provide innovation, technological growth, and economic development at the State and National level.

What Does Success Look Like for STEM Action Center?

- Attracting new investors and companies while supporting the expansion of existing Utah businesses by providing STEM-capable talent.
 - Supporting the Governor’s commitment to education and industry as partners in economic development.
- Leveraging resources to increase impact in education and talent alignment.
- Promote Utah as a talent rich state.
 - Improved proficiency in K-12 math and science scores.
 - Increased student and teacher engagement in STEM education and career pathways.
 - Improved teacher effectiveness that results in improved achievement for students.
- Increased investment in STEM education by Utah companies.
- Increased collaboration between K-16, industry, government agencies, and community.
- Increase in STEM graduates in Utah and an increase in Utah companies that hire students prepared with STEM skills.

The Utah STEM Action Center will address these issues through our programs and their program objectives, strategies and actions:

STEM Programs

Legislatively mandated funding

1. K-12 Math Personalized Learning
2. Professional Learning
3. Elementary STEM Endorsement
4. High School STEM Industry Certification
5. K-16 Computing Initiative

Operational funding

6. STEM School Designation
7. Classroom Grant
8. Organization Grant

Foundation developed funding

9. Utah STEM Bus
10. STEM For Life

Operational Support

1. Utah STEM Foundation
2. Marketing/Communications Outreach & Engagement

STEM Action Center Strategic Plan:

01. STEM Education

Implementing a broad-reaching strategy in the K-12 education system that supports high quality STEM professional learning for teachers.

- S1. STEM Action Center acts as a research and development center to collect and disseminate best practices for STEM education.
 - A1. “Best Practices” Educational Tools Provision to educators.
 - M1. Educators are using the top 15 identified “best practice” education tools.
- S2. Use resources to bring the latest in STEM education into Utah’s classrooms.
 - A1. Interscholastic STEM activities school participation.
 - M1. High schools participation in STEM fairs, camps, competitions.
 - A2. Mathematics Achievement change.
 - M1. Measure increase in student achievement Utah State Board of Education (USBE) data for mathematics standardized testing.
- S3. Enhance achievement in STEM-related aptitudes, skills and understanding of concepts.
 - A1. K-12 Math Personalized Learning Tools.
- S4. Increase teacher effectiveness in STEM-specific instruction, content, recruitment and retention.
 - A1. Professional Learning project.
 - A2. Elementary STEM Endorsement.
 - M1. Work with a third party evaluator to identify, collect, analyze and report data that determines effectiveness of all classroom and educator based projects.
- S5. Increase rigor, relevance and project-based learning in STEM-related areas.
 - A1. 7th and 8th grade Applied Science project in Career and Technical Education (CTE).
 - A2. High School STEM Industry Certification
 - A3. Classroom grants
 - A4. Student Fairs and Competition grants
 - M1. Use of software to manage and track data for all micro-grants.
- S6. Promote legislative, parent and student awareness of STEM education and careers.
 - A1. Advocate for targeted and intentional funding that supports efforts in STEM education and career development.
 - A2. Communicate STEM activities and successes to the Utah community at large.
 - M1. Document communication, media events, and social responses.

O2. Establish best practices and tools for K-12 in STEM

Providing independently-assessed best practice tools and resources for teachers, administrators, parents, and students.

- S1. Facilitate the identification and application of best practices in STEM.
 - A1. Best Practices Conference
 - A2. Ongoing data collection and analysis with third party evaluator.
- S2. Promote career awareness and readiness of K-16 Students.
 - A1. 7th and 8th grade Applied Science project in Career and Technical Education (CTE).
 - A2. High School STEM Industry Certification

O3. STEM Community Engagement

Increasing participation in interscholastic programs that recognize student achievement in STEM and ensuring publication of those results to the broader community.

- S1. Motivate and promote awareness and engagement in STEM efforts.
 - A1. STEM Fest
 - A2. Media Campaign
 - A3. Dynamic STEM website with deep resources for teachers, students and community at large.
 - A3. Utah STEM Bus—mobile classroom.
 - A4. Student participation in interscholastic STEM activities.
 - M1. Document participation in and satisfaction with conferences and outreach events.
- S2. Facilitate partnerships to promote support of STEM efforts in Utah.
 - A1. STEM Match mobile app
- S3. Align STEM education with talent needs of Utah companies.
 - A1. Engage private industry to provide STEM mentoring and support of program development.
 - A2. Utah STEM Industry Coalition
 - A3. K-16 Computing Initiative
 - M1. Track corporate investment (cash and in-kind).
 - M2. Document partnerships that result in innovation and effective program design and development.
- S4. Engage the media to support student STEM achievement.
 - A1. Track effectiveness of website and social media as a portal for information by documenting basic demographics, pages most frequented.

STEM Program Summaries

K-12 Math Personalized Learning

The STEM Action Center provides access to a selection of personalized learning software programs that have demonstrated through a rigorous evaluation process that there is a statistically significant relationship between program use and improved student outcomes in math.

- 01. Ensure that personalized math learning programs made available to schools are high quality, cost effective, and improve student achievement.**
- 02. Ensure that products are being used effectively, in a way that increases students' mathematics growth and proficiency.**
- 03. Recognize the limited resources allocated to math personalized learning. Ensure all allotted dollars are spent wisely and appropriately.**

Professional Learning

Support the intentional inclusion of STEM education through professional learning opportunities that will positively impact student experiences, outcomes, and growth in teacher practices.

- 01. Incorporate STEM Education, as defined by Utah State Board of Education (USBE) in Utah public education classrooms by supporting appropriate teacher professional learning opportunities.**
- 02. Create, provide, and support professional learning opportunities in alignment with legislation defining effective professional learning that provides value to the STEM community.**
- 03. Create and maintain a resource center for STEM-focused professional learning opportunities, leading to a reputation as a STEM resource throughout the state and nation.**
- 04. Establish, maintain, and justify professional learning funds allocated to STEM Action Center.**

Elementary STEM Endorsement

Provide elementary teachers in Utah access to additional education regarding STEM content and pedagogical skills needed to effectively incorporate STEM education into their classrooms.

- 01. Incorporate STEM education in Utah public elementary school classrooms by providing access to a state-recognized endorsement program designed for elementary school teachers. Content is to be delivered by higher education faculty, based on the agreed upon course frameworks, to increase content knowledge and pedagogical strategies.**
- 02. Engage educators, local education agencies (LEAs), Utah State Board of Education (USBE), and higher education partners in creating and maintaining partnerships and resources relating to STEM education in elementary schools.**

High School STEM Industry Certification

Pre-cursor to K-16 Computing Initiative – funding is completed

Establish pathway programs between secondary, post-secondary, industry, cultural and community partners, which create career awareness and build talent pipeline.

- 01. Incentivize secondary, post-secondary, industry partnerships, which provide secondary students with industry-recognized certifications and internship opportunities to prepare students for advanced education and employment.**
- 02. Increase visibility of specific industry-education partnership successes.**
- 03. Support transition from HS STEM Industry Certification Grant Program to K-16 Computing Initiative.**

K-16 Computing Initiative

This program was authorized by the legislature for commencement July 1, 2017. Consequently, the current strategy is under development by the agency and stakeholders, but the following outline provides preliminary planning prior to program launch.

Motivate students to participate in computing opportunities and elevate the relevance of computing education and careers.

- 01. Align connected network with shared goals, metrics and outcomes.**
- 02. Engage Industry-led, Advisory Group.**
- 03. Provide high quality professional learning and collaborative instructional support strategies.**
- 04. Support development and maintenance of relevant and rigorous courses and content.**
- 05. Provide equity and access to all students – including rural/urban, female, minorities, at-risk youth and people with disabilities.**
- 06. Establish pathway programs between secondary, post-secondary, industry, and cultural and community partners.**
- 07. Develop an engaging outreach and awareness plan.**

STEM School Designation

Provide a structured framework for schools to complete a thorough self-evaluation to inform long-term goals and success metrics that help to align teacher efforts and community expectations in STEM efforts.

- 01. Bring real-world applications of STEM into an educational context.**
- 02. Create, maintain, and disseminate research-based information surrounding STEM content-area knowledge, pedagogical success, and effective community engagement to assist schools in attaining and maintaining STEM designations.**

Classroom Grant

Recognizing that innovation developed by successful teachers needs to be replicated and shared, grants will be used to fund approaches to STEM education that enable teachers to implement innovative STEM ideas in the classroom.

- 01. Provide a mechanism which facilitates increased access to and involvement in innovative STEM curricula throughout Utah.**
- 02. Actively monitor funding of grants to support all components of STEM education.**
- 03. Actively promote innovative approaches, including curriculum, material design and STEM best practices statewide.**

Organization Grant

Incorporating Fairs Camps and Competitions student grants

The STEM Action Center funds grants to support innovative STEM programming for Utah preK-12 students in order to increase student STEM awareness and involvement.

- 01. Broaden student access to, and involvement in, STEM programs.**
- 02. Create statewide partnerships with organizations invested in Utah STEM education.**

Utah STEM Bus - USB

To ignite a passion for STEM education statewide, the STEM Action Center will utilize a mobile classroom to introduce real world learning experiences to students, parents and educators. The curricula will align with state standards and help build STEM talent.

- 01. Develop and maintain relevant and effective curricula that align to current state standards.**
- 02. Provide high quality and effective instruction of STEM content.**
- 03. Maintain community engagement with STEM Action Center and Utah STEM Bus.**
- 04. Implement a sustainability plan which provides ongoing support and program growth.**

STEM for Life

Funding from Intermountain Healthcare was awarded in May 2016.

The STEM for Life program promotes STEM Education through healthcare and healthy lifestyle themes.

- 01. Educate Utah students about the healthcare careers that exist in the state, and encourage them to pursue those careers in the future.**
- 02. Encourage increased industry support of integrated STEM in healthcare education.**

Operational Support

Utah STEM Foundation

The Utah STEM Foundation is the 501c3 non-profit fundraising arm of the Utah STEM Action Center, created in May 2016. The Utah STEM Foundation was created by legislative mandate to:

- Seek to enhance STEM funding and resource opportunities
 - Seek to create sustainable programs that will:
 - Connect industry to the classroom
 - Increase STEM workforce opportunities in Utah
- 01. Identify program focus areas in the near and long-term to enable the Foundation to meet its fundraising goals, as well as organizational purposes.**
 - 02. Follow a Fundraising and Financial Development Plan to provide a corporate level of awareness supporting STEM education.**
 - 03. Establish an endowment that will align STEM education with the talent needs of Utah's workforce.**

Marketing/Communications Outreach and Engagement

The STEM Action Center Marketing/Communications office will promote STEM statewide and where applicable nationally. These efforts will be undertaken to ensure the STEM Action Center remains essential to building partnerships with industry and community to assure Utah's long-term economic prosperity.

- 01. Create an agency strategy that addresses the Standard Target Audience (STA) of legislators, teachers, students, parents, administrators & industry members.**
- 02. Execute marketing plan which will include media outreach and social connectivity with the Standard Target Audience (STA).**
- 03. Create STEM managed events and sponsor external events that support the mission objectives of the agency programs and further the overall mission of the agency.**



Program Level Strategic Plans

K-12 Math Personalized Learning¹

The STEM Action Center provides access to a selection of personalized learning software programs that have demonstrated through a rigorous evaluation process that there is a statistically significant relationship between program use and improved student outcomes in math.

01. Ensure that personalized math learning programs made available to schools are high quality, cost effective, and improve student achievement.²

- S1. Qualitatively and quantitatively evaluate math personalized learning products.
 - A1. Evaluate correlations between student's math proficiency and product use.
 - A2. Evaluate correlations between student growth and product use.
 - A3. Examine the ROI of each math program.
 - A4. Evaluate qualitative feedback about each program from teachers and students.
 - M1. Quantitative/qualitative analysis of math products using teacher surveys, student surveys, and SAGE data – broken down by grade level, and stratified by level of usage.
- S2. Determine how math programs influence students' perceptions of mathematics.
 - A1. Survey students at the beginning of the year, and at the end of the year to examine students' perceptions of math and other math related subjects.
 - M1. Analyze difference in change from pre to post survey between control and treatment groups.

02. Ensure that products are being used effectively, in a way that increases students' mathematics growth and proficiency.³

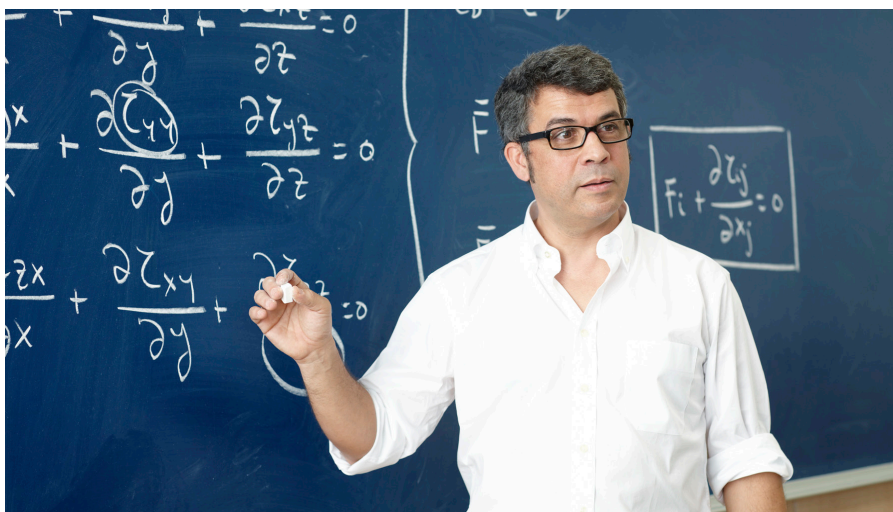
- S1. Define effective usage for each program.
 - A1. Analyze longitudinal usage data to determine "effective usage" levels for each product.
 - A2. Define usage standards to align with "effective usage."
 - A3. Shift the focus of stakeholders from "fidelity" (product provider recommended usage level), to "effective usage," based on Utah data.
 - M1. Changes in SAGE scores stratified by students' level of use, by product, comparing students with access to STEM Action Center approved software against students with no access to approved software.
- S2. Ensure that math technology is implemented equitably and used effectively.
 - A1. Move any licenses that are not used in a timely manner to other schools.
 - M1. Analysis of usage data from product providers.

- A2. Request implementation plans for grant participants, beginning the 2018-19 school year to determine best practices for implementation.
M1. Number of plans received.
- A3. Provide examples of successful implementation. Identify universal factors that influence successful integration of technology.
M2. Number of shared best practices.

03. Recognize the limited resources allocated to math personalized learning. Ensure all allotted dollars are spent wisely and appropriately.⁴

- S1. Create mechanisms to increase program capacity.
 - A1. Provide funding for a product to each adopting school for a defined implementation cycle to ensure effective use of personalized learning technology.
 - A2. As LEA's (districts and charter schools) demonstrate and that they have fully and effectively adopted math software, they have the opportunity to request a rollover of previous funding to new schools or classrooms within the LEA.
 - A3. Each year the STEM Action Center will allocate a percentage of funding to support new and/or high needs schools that will directly affect rural and underrepresented students.
 - A4. Advocate for new funds to meet increased demand.
 - A5. Actively market academic achievement success to the standard target audience in order to increase stakeholder buy in and expand implementation.
M1. Number of first time and returning applicants.

1. HB139:292-342 & HB150:284-331
 2. HB139:279-280 & HB150:279-280
 3. HB139:215-221 & HB150:229-233
 4. HB139:226-227 & HB150:223-224



Professional Learning

Support the intentional inclusion of STEM education through professional learning opportunities that will positively impact student experiences, outcomes, and growth in teacher practices.¹

01. Incorporate STEM Education, as defined by Utah State Board of Education (USBE) in Utah public education classrooms by supporting appropriate educator professional learning opportunities.

- S1. Maintain current, accurate content area knowledge focused on state content area standards.
 - A1. Stay informed on science and mathematics state standards and participate in revisions and updates.
 - A2. Participate as an active member on USBE STEM team.
 - A3. Stay current on science and mathematics research and development pertaining to topics taught to students.
- S2. Provide examples of STEM subject integration into other content areas based on core curriculum standards.
 - A1. Share examples of STEM integration activities within the following content areas: English Language Arts (ELA), Social Studies, Physical Education (P.E.), and Arts.
 - A2. Administer informal survey about integration example needs, based on subject areas and/or state standard topics.
 - M1. Track which subject area integration ideas are most visited/clicked.
 - M2. Use survey to determine integration support needs based on subject areas and/or state standard topics from teachers and administrators in the STEM community.
- S3. Share examples of research-based best practice STEM teaching strategies.
 - A1. Share examples via website and/or newsletter, including references for further information and study.
 - A2. Administer online survey about areas of STEM education implementation strategies most needed by educators and administrators.
 - M1. Track which category of teaching strategies is most visited.
 - M2. Produce gap analysis on areas of implementation support needed by teachers and administration. Over time, areas of need will become smaller and more defined by local needs.

02. Create, provide, and support professional learning opportunities in alignment with legislation defining effective professional learning that provides value to the STEM community.

- S1. Align available professional learning opportunities to legislative description of professional learning, found in 2014 GS HB 320.²
 - A1. STEM Action Center product partner professional learning opportunities will follow guidelines for effective professional learning.

- A2. Learning opportunities provided by STEM Action Center staff will follow guidelines for effective professional learning and best practice regarding adult education.
- A3. Instruction offered via STEM Action Center funded professional learning programs will adhere to guidelines for effective professional learning.
- A4. Promote STEM related professional learning opportunities provided by other agencies on calendar and social media.
 - M1. Use the defined guidelines for effective professional learning as rubric components for STEM Action Center funded professional learning applications.
 - M1. Track number of educator participants engaged in STEM-related professional learning opportunities offered or supported by STEM Action Center.
- S2. Provide and support opportunities that offer value in the form of additional content knowledge or pedagogical strategies to a variety of stakeholders including educators, schools, local education agencies and STEM-industry agencies.
 - A1. Facilitate the acquisition of re-licensure points based on hours of participation or other metrics as deemed appropriate by the State Board of Education to be used for renewing teacher licenses.
 - A2. Emphasize appropriateness of STEM professional learning as a component of the annual educator professional growth plan (PGP).
 - A3. Encourage participants to apply for USBE or university credit for the purpose of license renewal and lane changes affecting teacher compensation.



- M1. Capture student data to analyze the difference in schools that do and do not participate in STEM related professional learning opportunities.
 - M2. Track teacher and student data longitudinally to determine eventual impact on Utah STEM job preparedness and the rate of Utah public school graduates filling Utah STEM-industry positions.
 - M3. Use the professional learning tracking system selected by the State Board of Education to determine the number of teachers getting points for STEM related professional learning opportunities.
- S3. Identify successful professional learning opportunity structures currently in place and use these models as exemplars.
 - A1. Establish and maintain relationships and protocols with credit-granting agencies including USBE and higher education partners.
 - A2. Identify and share USBE approved STEM-related endorsement programs, including the Elementary STEM Endorsement, as well as professional learning opportunities available to educators in the summer months or other year-long learning resources.
 - A3. Rely on local education leaders to drive decision making about individual community needs.
 - M1. Complete a baseline asset inventory of STEM learning resources and then track the number of participants and learning opportunities available, including year-long programs, summer programs and single event opportunities.
 - M2. Track needs of educators and administrators regarding professional learning, then determine which professional learning opportunities the STEM Action Center can provide and/or support.

O3. Create and maintain a resource center for STEM-focused professional learning opportunities, leading to a reputation as a STEM resource throughout the state and nation.

- S1. Develop and maintain resource library on STEM Action Center website.
 - A1. Provide classroom activities, research-based teaching strategies and examples, and cross-content connections based on teaching standards.
 - A2. Include examples of effective video self- and peer-reflection about STEM in a classroom as well as templates and rubrics to support the integration of video based reflection.
 - M1. Administer a survey to teachers about the perceived impact on instruction after participating in video self-reflection.
 - A3. Share the dimensions required for STEM School Designation as a framework for focused school-wide improvement.
 - M1. Use data from website to determine which content areas are most visited and the amount of time typically spent with a resource.
 - M2. Collect data on the number of schools and individuals inquiring about the STEM School Designation process.

O4. Establish, maintain, and justify professional learning funds allocated to STEM Action Center.

- S1. Utilize the STEM School Designation as framework for targeted school-wide improvement.
 - A1. Identify varying examples of successful schools for each dimension to act as models/mentors for their communities.
- S2. Administer a grant program founded on video-based educator self-reflection and targeted opportunities for improvement.
 - A1. Require program participants to complete self-reflection on a filmed portion of a lesson to identify growth in a targeted area of their teaching practice.
 - A2. Encourage educators to include STEM focused targeted goals in their annual professional growth plans.
 - M1. Use a variety of metrics, including pre/post surveys, submitted lesson plans, and teacher reflection templates and feedback to gauge success in teacher growth regarding STEM implementation.
- S3. Fund new participants of STEM Professional Learning projects annually.
 - A1. Solicit information about the process participating schools or districts have in place to eventually decrease the amount of funds needed from outside organizations to support STEM related professional learning opportunities.
 - M1. Determine the number of participating schools able to support their programs after 3 years and 5 years based on overall amount of project and amount of funding requested from STEM Action Center.
 - A2. Advocate for new funds and funding sources to meet increased demand.
 - M1. Collect longitudinal data on the number of teacher participants and annual costs per year of program.
 - M2. Use random sample of teachers surveyed to determine STEM professional learning needs in state.

1. HB 150/2014 UCA#63m-1-3209

2. HB 320/2014 Utah State Board of Education creates definition of professional development as “a comprehensive, sustained, and evidence-based approach to improving teachers’ and principals’ effectiveness in raising student achievement.” Professional learning is further described as meeting the following standards: “occurring within learning communities committed to continuous improvement, individual and collective responsibility, and goal alignment; requires skillful leaders who develop capacity, advocate, and create support systems, for professional learning, requires prioritizing, monitoring, and coordinating resources for educator learning; uses a variety of sources and types of student, educator, and system data to plan, assess, and evaluate professional learning; integrates theories, research, and models of human learning to achieve its intended outcomes; applies research on change and sustains support for implementation of professional learning for long-term change; and aligns its outcomes with: performance standards for teachers and school administrators as described in rules of the State Board of Education and performance standards for students as described in the core curriculum standards; and incorporates the use of technology in the design, implementation, and evaluation of high quality professional learning practices; and includes targeted professional learning on the use of technology devices to enhance the teaching and learning environment and the integration of technology in content delivery.”

Elementary STEM Endorsement

Provide elementary teachers in Utah access to additional education regarding STEM content and pedagogical skills needed to effectively incorporate STEM education into their classrooms.

O1. Incorporate STEM education in Utah public elementary school classrooms¹ by providing access to a state-recognized endorsement program designed for elementary school teachers. Content is to be delivered by higher education faculty, based on the agreed upon course frameworks, to increase content knowledge and pedagogical strategies.

- S1. Provide current, accurate STEM content area knowledge focused on K-6 state content area standards.
 - A1. Revise frameworks regularly with input from educators, Utah State Board of Education state Science and Elementary Mathematics Specialists, and higher education faculty to maintain consistency in program content while allowing for appropriate differentiation based on participants, instructors, and location.
- S2. Model and reflect on appropriate pedagogical techniques for STEM instruction.
 - A1. Share examples of research-based best practice STEM teaching strategies.
 - A2. Share video of teacher efforts for feedback from cohort group as exemplars.



- M1. Collect information on the total number of participants enrolled, progress toward completion, and recorded completed endorsements annually.
- M2. Utilize data on longitudinal student success based on teacher completion and implementation of knowledge and skills gained from completing the Elementary STEM Endorsement.

02. Engage educators, local education agencies (LEAs), Utah State Board of Education (USBE), and higher education partners in creating and maintaining partnerships and resources relating to STEM education in elementary schools.

- S1. Provide opportunities for schools and educators involved in STEM to gather informally and discuss challenges, success stories, and ask questions to improve content knowledge and teaching practices.
- S2. Identify schools and educators with exemplar integration of STEM, including those schools that have received a STEM School Designation.
- S3. Establish and maintain relationships and protocols with higher education partners.
- S4. Create and maintain cohorts based on location and existing partnerships.
 - M1. Survey administrators and educators about barriers to effective STEM implementation as a baseline data point.

1. HB 150/2014, UCA#63m-1-3209



High School STEM Industry Certification¹

Pre-cursor to K-16 Computing Initiative – funding is completed

Establish pathway programs between secondary, post-secondary, industry, and cultural and community partners which create career awareness and build talent pipeline.

01. Incentivize secondary, post-secondary, industry partnerships, which provide secondary students with industry-recognized certifications and internship opportunities to prepare students for advanced education and employment.

S1. Successfully complete current grant program.

A1. Monitor grantees for program, budget and data outcomes.

A2. Balance budgets for each grantee and for the program as a whole.

A3. Produce data/information to highlight best practices/lessons learned.

M1. Number of students participating, certifications earned, internships begun and successfully concluded.

M2. Quarterly report regarding progress, expenses and data.

02. Increase visibility of specific industry-education partnership successes.

S1. Share grantee stories and testimonials.

A1. Grantee participation in Best Practice Conference sessions, publications, and STEM visibility opportunities through social media.



03. Support transition from High School STEM Industry Certification Grant Program to K-16 Computing Initiative.

- S1. Use lessons learned from current program to inform the internal and external processes, management, data tracking and sharing, and collaboration opportunities between grantees.
 - A1. Provide orientation to grantee administrators, so that they are able to establish local management processes, data tracking, and reporting, which meet the requirements of the statewide computing program.
 - A2. Provide ongoing budget updates with accurate funding levels to be transferred from HS STEM to CS/IT HS STEM Industry Certification Grant programs.
 - M1. Quarterly reports regarding progress, expenses and data including participation, certifications and internships

1. HB 150/2014 line 394, 63M-1-3211, allows the STEM Action Center to award grants to fund STEM related certification for high school students.



K-16 Computing Initiative

This program was authorized by the legislature for commencement July 1, 2017. Consequently, the current strategy is under development by the agency and stakeholders, but the following outline provides preliminary planning prior to program launch.

Motivate students to participate in computing opportunities and elevate the relevance of computing education and careers.

01. Align connected network with shared goals, metrics and outcomes.

- S1. Build Communities of Practice
- S2. Establish broad partnership, led by industry, which includes:
 - K-12 districts and charter schools and Utah State Board of Education
 - Higher education, 2- and 4-year institutions
 - Government agencies including Utah Department of Workforce Services, Department of Heritage & Arts, Office of Energy Development, Department of Natural Resources
 - Community and Cultural Partners
 - Talent Ready Utah
- S3. Integrate all computing efforts to leverage resources, including:
 - Code.org grant (K-12 professional learning)
 - CREATE Labs and Carnegie Mellon University grant (content, supplies and professional learning)



- Utah SB93 (tuition reimbursement for secondary endorsement)
- Expanding Computer Education Pathways (ECEP)

02. Engage Industry-led Advisory Group.

- S1. Establish core industry committee to advise STEM Action Center Executive Board.
- S2. Develop early employment opportunities for undergraduates.
- S3. Identify industry partner linkages with education to include classroom engagement, curriculum review, work-based learning opportunities, and CS IT advocacy with legislative, education and community entities.

03. Provide high quality professional learning and collaborative instructional support strategies.

- S1. Inventory all curriculum offerings.
 - A1. Inventory all vendor curriculums used in LEAs.
 - A2. Identify/highlight successful curricula from pilot grant recipients.
- S2. Provide clearinghouse of instructional support choices at each level of education.
- S3. Provide teacher professional learning for successful curricula.

04. Support development and maintenance of relevant and rigorous courses and content.

- S1. Provide multiple entry and exit points in the educational continuum.
- S2. Identify high quality resources for elementary and middle school classrooms.
- S3. Support work-based learning opportunities.



O5. Provide equity and access to all students – including rural/urban, female, minorities, at-risk youth and people with disabilities.

- S1. Develop distance and blended learning models.
- S2. Create virtual industry engagement.
- S3. Create incentives for underrepresented and at-risk populations.
- S4. Identify and target root causes of low participation.

O6. Establish pathway programs between secondary, post-secondary, industry, and cultural and community partners.

- S1. Administer High School STEM Industry Certification Grant Program—CS IT.¹
 - A1. Fund secondary, post-secondary, industry partnerships which provide secondary students with industry-recognized certifications and internship opportunities.
 - A2. Prepare high school students to pursue advanced education and/or employment.
 - M1. Student participation.
 - M2. Certifications earned.
 - M3. Internships begun and successfully concluded.
 - M4. Quarterly report regarding progress, expenses and data.
- S2. Administer SB 190 Grant Program (K-8 emphasis).²
 - A1. Design and implement comprehensive K-16 Computing Grants Program, based upon the following common elements:
 - (a) outreach and student engagement;
 - (b) courses and content;
 - (c) instruction and instructional support;
 - (d) work-based learning opportunities;
 - (e) student retention;
 - (f) industry engagement;
 - (g) stacked credentials that allow for multiple exit and entry points;
 - (h) competency-based learning strategies; and
 - (i) secondary and post-secondary collaborations.
 - A2. Fund collaborations/partnerships between K-12, post-secondary, industry and cultural and community partners to develop stacked credential pathways and build infrastructure for capacity expansion.
 - M1. Established grant application and approval process.
 - M2. Established success metrics for projects.
 - M3. Increased number of programs and certificates/degrees.
- S3. Procure Department of Labor H-1B Grant to fund upper High School through adult computing pathway projects.
 - A1. Create and align K-16 computing content and courses.
 - A3. Implement outreach and engagement strategies.
 - A4. Implement high quality professional development and innovative strategies for instructional support.
 - A5. Accelerate talent readiness through Early Industry Induction model.

S4. Identify additional funding streams which may be leveraged for pathway development for partner agencies and initiatives.

A1. Consider partner applications for: SWI, TRU/UCAP.

07. Develop an engaging outreach and awareness plan.

S1. Develop a high impact marketing and messaging campaign which emphasizes importance of computing education.

S2. Create materials and activities to engage parents and counselors.

S3. Develop afterschool and summer camp opportunities.

S4. Identify/create teacher, counselor, and administrative recruitment opportunities.

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1. HB 150/2014 line 394, 63M-1-3211, allows the STEM Action Center to award grants to fund STEM related certification for high school students.
 2. SB 190/2017 line 69, 63N-12-214, grants creates the Computing Partnerships Grants program consisting of grants created in this part to provide for the design and implementation of a comprehensive K-16 computing partnerships program.



STEM School Designation

Provide a structured framework for schools to complete a thorough self-evaluation to inform long-term goals and success metrics that help to align teacher efforts and community expectations in STEM efforts.¹

01. Bring real-world applications of STEM into an educational context.

- S1. Involve business partners with local school communities to build engagement and awareness of needs.
- S2. Provide resources and support to create a continuum of community schools (elementary, middle/junior high school, and high school) with a focus on STEM-integration.
- S3. Meet parent expectations for providing students with a well-rounded education while preparing students to be college and career ready. Reports on future employment trends indicate that students with a well-rounded education are able to meet workforce demands without sacrificing other educational interests.



O2. Create, maintain, and disseminate research-based information surrounding STEM content-area knowledge, pedagogical success, and effective community engagement to assist schools in attaining and maintaining STEM designations.

- S1. Engage STEM designated schools in events that increase knowledge and awareness of STEM education, such as STEM Fest, STEM Academy for School Administrators, Best Practices Conference, and other events.
- S2. Maintain a network of schools, communities, and individuals to identify exemplars, act as mentors, and support new efforts within varying geographic locations.
 - M1. Determine annually the number of schools that are beginning, working on, and completing the STEM School Designation process.

1. HB 150/2014 lines 246-248, UCA#63m-1-3208



Classroom Grant

Recognizing that innovation developed by successful teachers needs to be replicated and shared, grants will be used to fund approaches to STEM education that enable teachers to implement innovative STEM ideas in the classroom.¹

01. Provide a mechanism which facilitates increased access to and involvement in innovative STEM curricula throughout Utah.²

- S1. Manage an annual statewide competition to find the best new ideas, and the accompanying fully developed, sharable lesson plans.
 - A1. Awarding the outstanding plan of the year and other honors.
 - M1. Awarded through a transparent selection process.
- S2. Maintain a repository highlighting STEM best practices that teachers can access for information and ideas.
 - A1. Require all awardees to submit shareable curriculum, photos/graphs/illustrations, and lesson plans which are tied to state standards.
 - M1. Track STEM repository usage.
- S3. Each year the STEM Action Center allocates a percentage of the classroom grant funding to support new and/or unique programs that will directly affect underrepresented, rural, and high-need students.
 - M1. Number of first time and returning applicants.



02. Actively monitor funding of grants to support all components of STEM education.³

- S1. Ensure that there are resources allocated for each STEM subject.
 - A1. Using a qualified advisory committee, actively engage in sourcing innovative curricula in each of the four STEM content areas.
 - A2. If one STEM area or grade level has limited content, endeavor to target these gaps in curriculum development.
 - M1. Track the total number of STEM resources for each content area, by grade level.

03. Actively promote innovative approaches, including curriculum, material design and STEM best practices statewide.⁴

- S1. Increase teachers' awareness and use of the classroom grant program and curricula that have been created.
 - A1. Utilize various marketing and communication tools to promote awareness and active use of created curricula.
 - A2. Showcase the "best of the best." Invite exemplar participants to share their successes at appropriate events such as STEM Best Practices conference and Utah Science Teachers Conferences, etc.
 - M1. Track the number of teachers/students impacted.
 - A3. Highlight the STEM repository.

1. HB139:226-227 & HB150:223-224

2. HB139:236-242 & HB150:234-240

3. HB139:264-265 & HB150:264-265

4. HB139:228-229 & HB150:225-226



Organization Grants

Incorporating Fairs Camps and Competitions student grants¹

The STEM Action Center funds grants to support innovative STEM programing for Utah preK-12 students in order to increase student STEM awareness and involvement.

01. Broaden student access to, and involvement in, STEM programs.²

- S1. In order to ensure equity, this program will support organizations with new and/or unique programs that will directly impact rural and high-need communities in addition to traditional Wasatch Front efforts.
- A1. Complete thorough review of funding opportunities for organizations that offer STEM programs.
- A2. Promote STEM opportunities to students and parents.
 - M1. Number of students participating.
 - M2. Number of first time and returning applicants.
 - M3. Track geographic distribution of funds.



02. Create statewide partnerships with organizations invested in Utah STEM education.³

S1. Expand program awareness.

- A1. Produce media publications highlighting program successes.
- A2. Seek out presentation opportunities at community groups, conferences, etc.
- A3. Utilize STEM Action Center Marketing: spotlights, social media, newsletters, events, etc.
 - M1. Number of applicants per solicitation.

S2. Develop influential STEM Action Center advocates from funded organizations.

- A1. Leverage grantee successes to establish a budget line item.
- A2. Require funded organizations to recognize/promote the STEM Action Center support of their programs.

1. HB 139/2013, 63M-1-3205 Line 222 directs the STEM Action Center to award grants to support STEM programming.

2. HB 139/2013 Line 190-191 indicate the STEM Action Center should ensure student participation in STEM fairs, camps and competitions.

3. HB 139/2013 Line 167-173 requires the STEM Action Center to have programs that coordinate STEM activities in the state.





Utah STEM Bus – USB¹

To ignite a passion for STEM education statewide, the STEM Action Center will utilize a mobile classroom to introduce real world learning experiences to students, parents and educators. The curricula will align with state standards and help build STEM talent.

01. Develop and maintain relevant and effective curricula that align to current state standards.

- S1. Engage industry and education community members in a curriculum development coalition to assess curriculum needs.
 - A1. Utilize a curriculum committee made up of educators, industry and community representatives.
- S2. Maintain a process by which curriculum will be reviewed annually for relevance, reception, effectiveness, workforce connection, and alignment with state standards.
 - A1. Seek out industry participation for development of cutting edge curricular content.
 - A2. Assess the interest of students and educators through participation in a survey regarding programs taught on the Utah STEM Bus (USB).
 - A3. Conduct an ongoing program introducing new, relevant, and cutting edge USB curriculum using an established policy.
 - M1. Track industry participation in program development and sponsorship.
 - M2. Track the Number of USB classes requested and taught statewide.
 - M3. Assess pre and post awareness and enthusiasm for further STEM study.

02. Provide high quality and effective instruction of STEM content.

- S1. Deliver relevant, engaging training that opens the minds of K-12 students to potential educational and career opportunities in STEM.
 - A1. Ensure the needs of rural, low-income and opportunity challenged populations are specifically addressed using curriculum that engages all students.
- S2. Make equipment and resources available, which may not always be accessible in traditional school communities.
 - A2. Teach only curriculum that has been vetted by industry and education partners and aligns with state educational standards.

03. Maintain community engagement with STEM Action Center and Utah STEM Bus.

- S1. Provide outreach programs that introduce STEM and connects communities with the STEM Action Center.
 - A1. Engage community through professional development through parent, community and industry events.
 - A2. Be a strong advocate for all STEM Action Center programs within communities served by the USB.
 - M1. Regularly review parent, student and educator awareness and support for the Utah STEM Bus program.





O4. Implement a sustainability plan which provides ongoing support and program growth.

- S1. Provide a connection point where industry can find resources to fulfill their STEM interests.
 - A1. Coordinate with the Utah STEM Foundation.
 - A2. Secure on-going financial and in-kind support to provide program consumables and curriculum development.
 - A3. Align USB programing with donor/sponsorship interests.
 - A4. Provide USB grants as funding is made available.
 - M1. Track USB program donations made through the STEM Action Center.
 - M2. Track the number of companies engaged with the Utah STEM Bus annually.
 - M3. Track the number of Utah STEM Bus grants awarded to schools annually.
- S2. Establish a volunteer program that supports Utah STEM Bus programs and curriculum development.
 - A1. Identify potential sources of volunteers.
 - A2. Utilize volunteers in program development and delivery.
 - M1. Track the number and hours of volunteers supporting the USB.

- S3. Provide USB programing to school community councils, community organizations, and parent organizations that reach beyond standard “on bus” student instruction.
- A1. Provide instruction opportunities for parents, educators and organizations supporting public education.
 - A2. Monitor demand for USB usage to determine appropriate program expansion.
 - A3. Have a process by which USB curriculum can be taught in a classroom when the bus is not available.
- S4. Maintain transparency of the program sufficient to meet legislative oversight and provides access points for parents, educators and industry.
- A1. Post quantitative and qualitative information about STEM Bus activities and accomplishments.
 - M1. Track total number of engagements with schools, industry and community organizations.

1. HB 150/214 Line 37 Expands the scope of the STEM education related technology program to more students.



STEM for Life

Funding from Intermountain Healthcare was awarded in May 2016.

The STEM for Life program promotes STEM Education through healthcare and healthy lifestyle themes.¹

01. Educate Utah students about the healthcare careers that exist in the state, and encourage them to pursue those careers in the future.

- S1. Use hands-on lessons, with real world applicability and clear career ties, to teach STEM in the classroom.²
 - A1. Select groups of Utah teachers to produce targeted modules that teach students about careers through hands-on activities and real world application.
 - A2. Ensure quality modules are submitted and compliance of participating teachers through clear project expectations.
 - A3. Create a repository of completed modules to be accessible to all Utah teachers.
- M1. Number of completed modules submitted to STEM AC at the end of the school year.



S2. Provide junior high and high school teachers with first-hand experiences of STEM careers that exist within the healthcare field so they will be better prepared to educate their students in the classroom.³

A1. Hold summer field trip opportunities for teachers, with multiple site visits over the course of two days.

A2. Holding regional Super Tours to ensure the careers teachers are exposed to are most applicable for their students.

M1. Pre and post surveys for participating teachers collected during Super Tours.

M2. Completed lesson plans submitted to STEM AC within a month of Super Tour.

S3. Ensure program sustainability.

A1. Use the Super Tours as an opportunity to recruit new cohorts of teachers for module development in the following school year.

M1. Number of industry partners invested in the program.

02. Encourage increased industry support of integrated STEM in healthcare education.

S1. Highlight the unique state/industry partnership of the STEM for Life program.

1. HB 139/2013 Line 40-43 states that the STEM AC work with industry to obtain private funding

2. HB 139/2013 Line 180 requires the STEM AC to provide assistance for Utah students

3. HB 139/2013 Line 180 requires the STEM AC to support professional development for educators



Operational Support

Utah STEM Foundation¹

Who we are:

The Utah STEM Foundation is the 501c3 non-profit fundraising arm of the Utah STEM Action Center, created in May 2016. The STEM Foundation was created by legislative mandate to:

- Enhance STEM funding and resource opportunities.
- Create sustainable programs that will:
 - Connect industry to the classroom.
 - Increase STEM workforce opportunities in Utah.

What Does Success Look Like for The Utah STEM Foundation?

- Attracting new investors and companies while supporting the expansion of existing Utah businesses by providing STEM-capable talent.
- Supporting the Governor's commitment to education and industry as partners in economic development.
- Leveraging resources to increase impact in education and workforce alignment.
- Increased investment in STEM education by Utah companies.
- Promote Utah as a talent savvy state.
- Increased collaboration between K-16, industry and community.
- Increase the number of Utah companies that hire students prepared with STEM skills.

The Utah STEM Foundation will address these issues through its programs and the STEM Action Center's program objectives, strategies and actions:

O1. Identify program focus areas in the near and long-term to enable the Foundation to meet its fundraising goals, as well as organizational purposes.

S1. Develop a programing plan.

- A1. Create a programing and design committee.
- A2. Analyze collaborators and competitors programs for insights.
- A3. Draft a list of potential programs, as well as suggested programs already initiated by the STEM Action Center.

- M1. Working with the Utah STEM Foundation board, Policies and Procedures documents will result from adopted programs.



02. Follow a Fundraising and Financial Development Plan to provide a corporate level of awareness supporting STEM education.

Establishing a Development Plan will allow the Foundation to outline potential sources of income and generate a plan for how income will be spent.

- S1. Identify additional strategic partners.
 - A1. Create and maintain a donor database.
 - A2. Utilize Utah STEM Foundation Board and STEM Action Center contacts for potential funding.
 - M1. With the STEM Action Center and the STEM Foundation Board participation, focus on a target number companies each month for possible relationship and funding opportunities.
- S2. The STEM Action Center Board will create fundraising goals.
 - A1. Cultivate existing donors and expand donor pool through active research and networking.
 - M1. The Utah STEM Foundation will set yearly goals based on programs selected and projected support from targeted donors.
 - M2. Grant and donation follow up, documenting, and reporting with each donation.
 - M3. File all appropriate tax forms and certification renewals.
- S3. Facilitate partnerships and create programs that will promote advocacy of STEM efforts in the State of Utah.
 - A1. Create inaugural and annual events to introduce each program or collaboration.
 - M1. Establish strategic sub-committees that align with programs initiated through STEM Action Center and Utah STEM Foundation.

03. Establish an endowment that will align STEM education with the talent needs of Utah's workforce companies.²

- S1. Create endowment allocations for each program that the STEM Action Center fund.
 - A1. Collaborate with nonprofit community organizations, government entities and other corporations, which are currently involved with entrepreneurship and STEM equity for underserved populations to expand more resource opportunities.
 - A2. Engage industry to provide STEM mentoring and support of these specific programs.
 - M1. Track corporate investment (cash and in-kind).
 - M2. Document partnerships that result in innovation and effective program design and development.
 - M3. Provide more staff to assist in fundraising efforts.

1. HB 150/ 2014 line 3, allows the STEM Action Center Board to create a foundation

2. HB426/ 2017 line 1, UCA#63N-12-204

Marketing/Communications Outreach & Engagement

The STEM Action Center Marketing/Communications office will promote STEM state-wide and where applicable nationally. These efforts will be undertaken to ensure the STEM Action Center remains essential to building partnerships to industry and community in an effort to assure Utah's long-term economic prosperity.¹

01. Create an agency strategy that addresses the Standard Target Audience (STA) of legislators, teachers, students, parents, administrators & industry members.

- S1. Maintain a regular communications outreach to STA through the media and direct mail, email and social media.
 - A1. Establish STEM awareness and relationships with key media organizations/departments. (i.e. KUTV, KSL, KUTV, Fox 13, KSL Radio)
 - A2. Create weekly high impact spotlights for legislators that feature their school district.
 - A3. Maintain a set of specific legislator based activities and information.
 - M1. Track the number of media stories, spotlights, legislator contacts and districts covered.

02. Execute marketing plan which will include media outreach, and social connectivity with the Standard Target Audience (STA).

- S1. Maintain the STEM Action Center's website with news, events and technical programmatic updates.
 - A1. Update news page on website and events page weekly.
 - M2. Quarterly verify that all content is current.
 - M1. Track the number of page visitors, page clicks and bounce rate.
 - A2. Include and update legislative mandated resources such as best practices and relevant legislation bills.
 - A3. Address all programmatic needs in regular meetings with program directors.
- S2. Monthly newsletter and weekly spotlight updating community on STEM opportunities and success in the state.
 - A1. Create newsletter that includes upcoming events, news around the state, grant opportunities and other STEM highlights.



- A2. Maintain template email for program directors to send spotlights that feature their program to be sent to legislators in targeted school districts.
 - M1. Track the number of newsletter open rates and increased newsletter sign ups.
 - M2. Track total number of created spotlights and open rate.
- S3. Maintain social media presence that furthers objectives through daily posts.
 - A1. Maintain regular contact with standard target audience including key legislators, school districts, industry partners etc.
 - M1. Track monthly: number and type of posts, number of followers, views, likes & clicks.
 - A2. Use all relevant social media applications such as Facebook, LinkedIn, Instagram etc. to reach STA.
 - M1. Increase in social media following; increase in post engagement from Google Analytics.

O3. Create STEM managed events and sponsor external events that support the mission objectives of the agency programs and further the overall mission of the agency.²

- S1. Oversee STEM created events including STEM Fest and STEM Best Practices.
 - A1. Utilize STEM Fest as a tool to build “ownership” and support with each part of the Standard Target Audience, specifically focused on improving support for the STEM Action Center with parents and legislators.
 - A2. Oversee STEM Best Practices event for teachers, to assist in meeting specific professional development objectives as defined by the Utah State Board of Education.
 - M1. Track the number of attendees at each event.
 - M2. Administer feedback surveys from each event to the standard target audience.
- S2. Exhibit and sponsor, when appropriate, to facilitate objectives at key STEM events across the state not “owned” by STEM Action Center.
 - A1. Coordinate activities and events with outside agencies, such as Women’s Tech Council, Utah Technology Council, Utah Jazz, CS/IT Industry Partners & educational institutions.
 - M3. Number of students/teachers impacted; engagement increase in social media.
- S3. Manage STEM Ambassador volunteers who assist with program and event implementation.
 - M1. Record number of hours each volunteer logs.

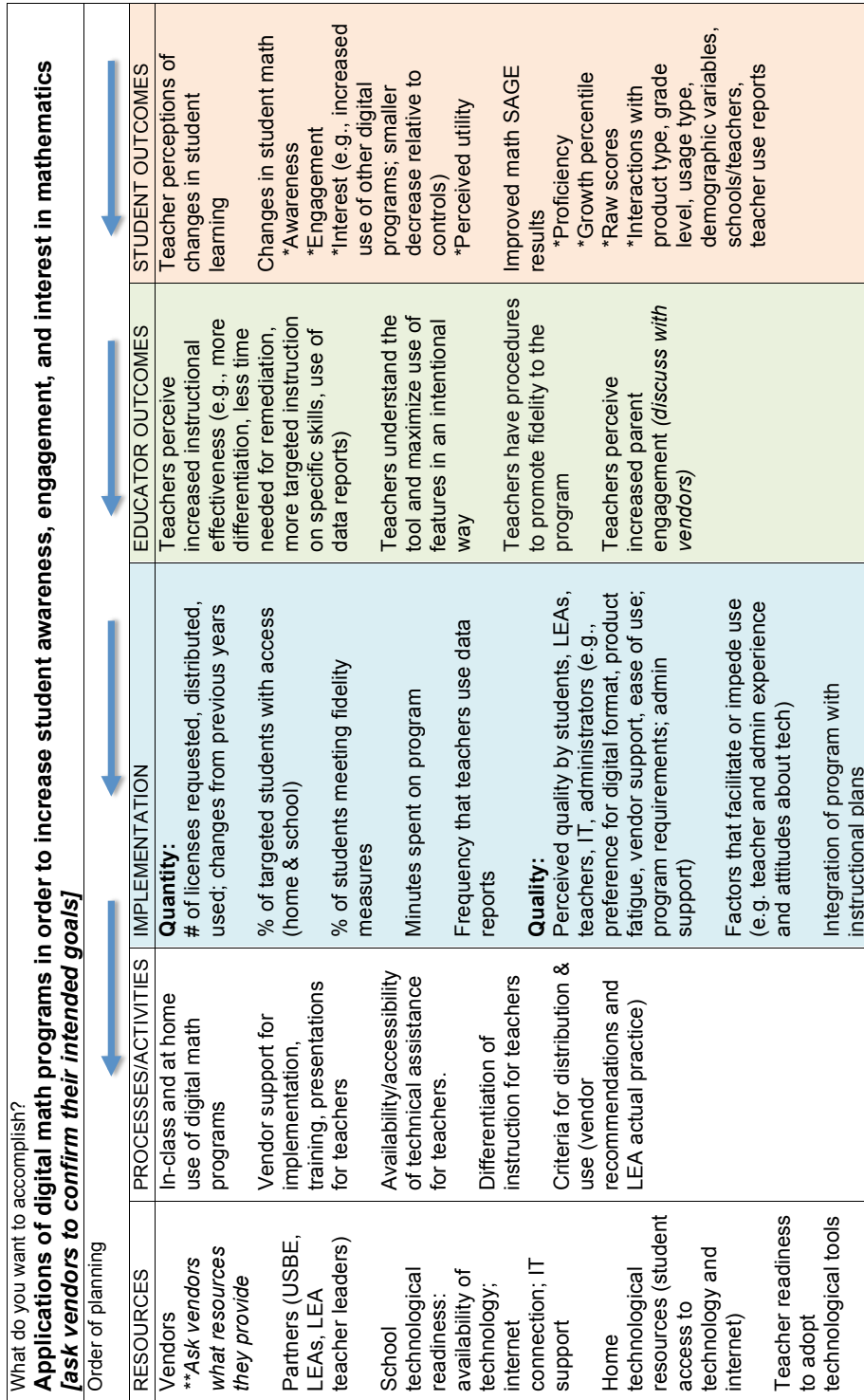
1. HB139/2013 Lines 163-197. In support of the responsibilities of the board the STEM Action Center will engage the stakeholders in the state, including children, educators, and industry in order to meet the objectives outlined in the creation of the Action Center

2. HB 139/2013 Lines 94-107 require the STEM Action Center to provide informational resources in support of the Center programs, including but not limited to, education, camps, grants and, programs created by the Center to fulfill its mission.



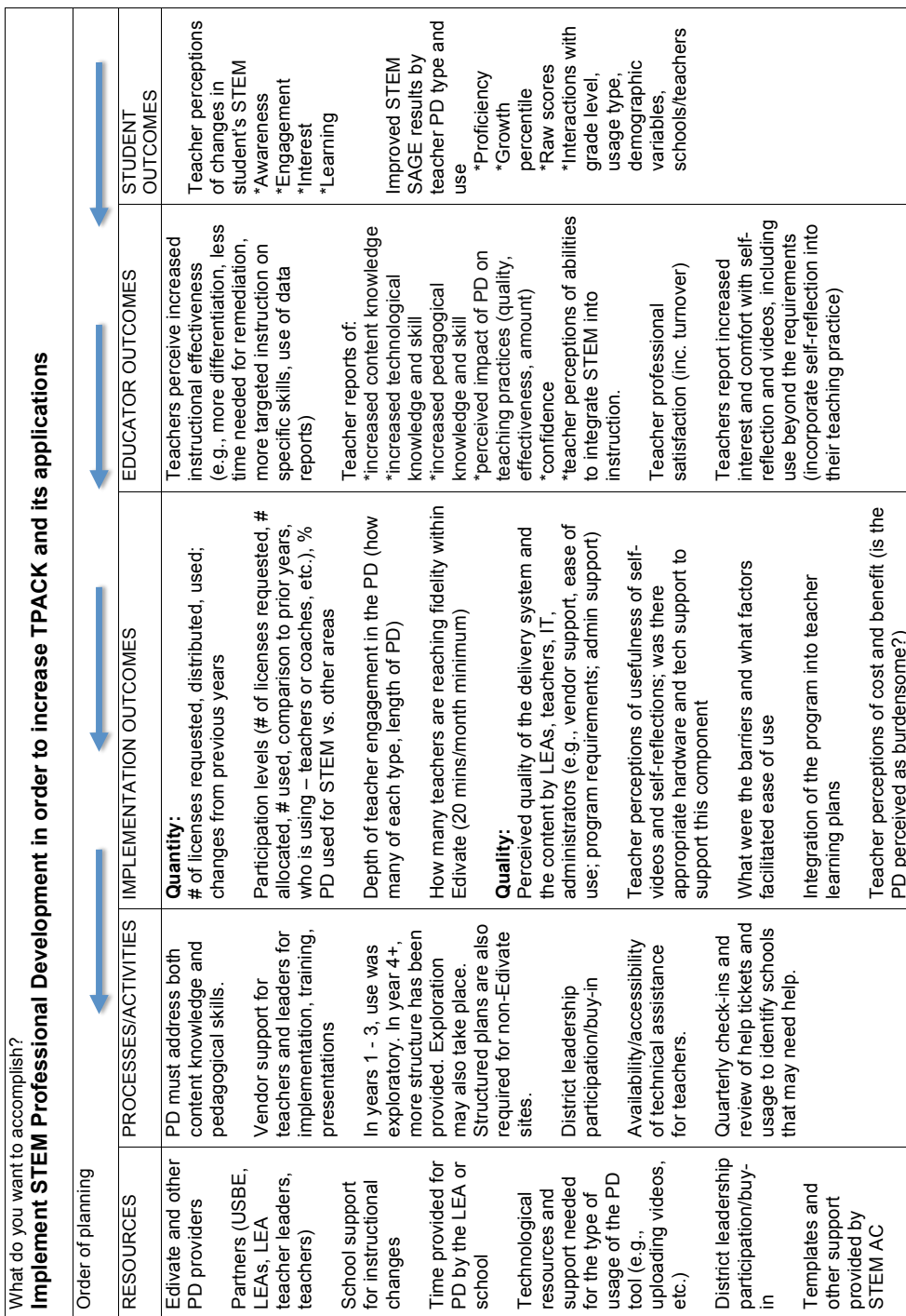
Appendix

Logic Model: K-12 Math Personalized Learning

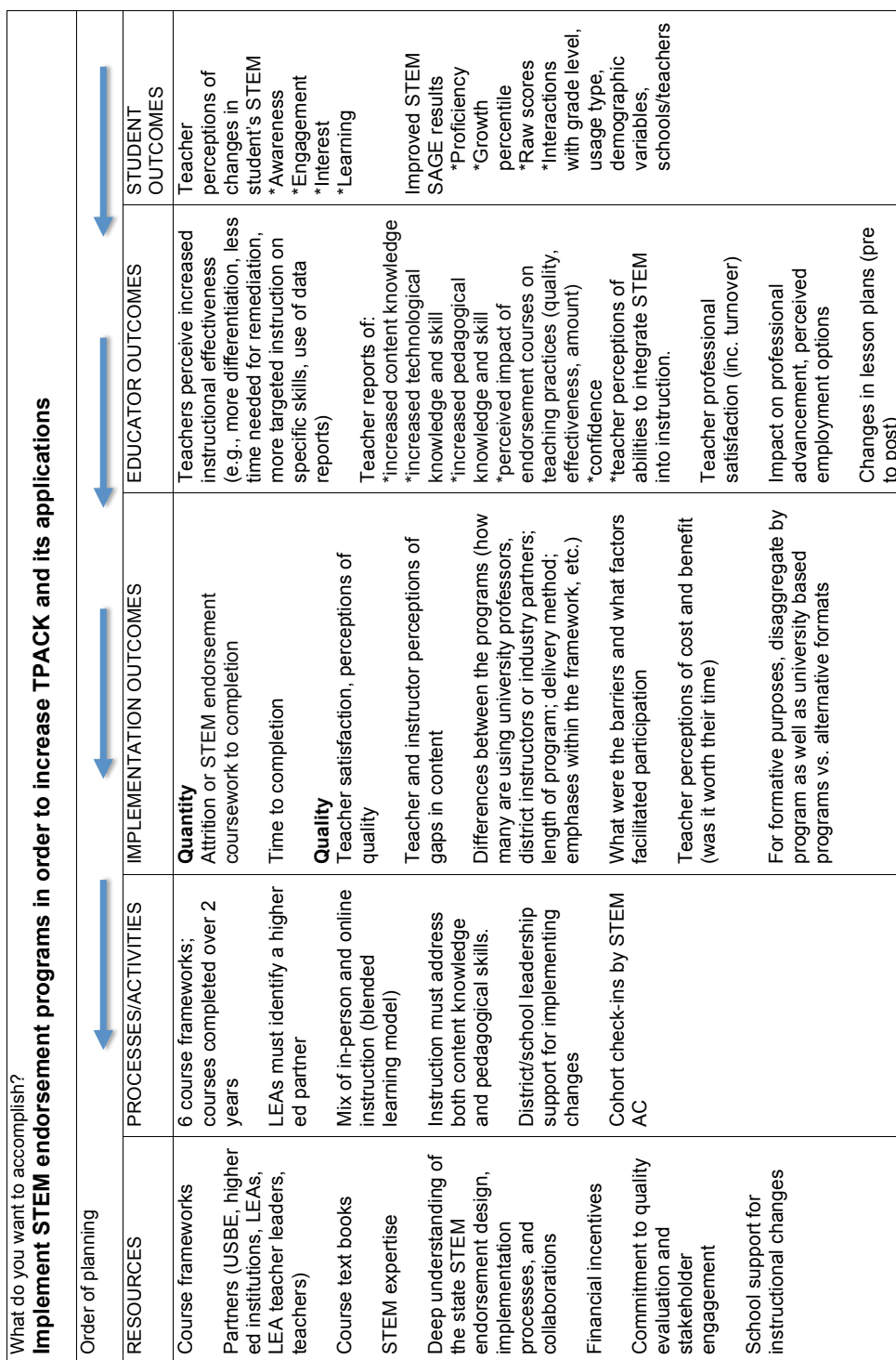


MTSS - Multi-tiered system of support; RTI 1) bring struggling students up to speed, 2) give to students to progress beyond, 3) main way is supplement to regular instruction (cyclical review, etc.) Regular assignment with remedial pieces. 4) quizzes and tests (allows students to have multiple attempts and master the material with immediate feedback.) 5) credit recovery.

Logic Model: Professional Learning



Logic Model: Elementary STEM Endorsement Program



Program Performance and Accountability Matrices

K-12 Math Personalized Learning						
Activity, Statute & Funding	Statutory	Performance Measures	Performance Impact FY15	Performance Impact FY16	Performance Goals FY17	Outcomes
Create a K-12 Math Personalized Learning program which is evaluated annually by an independent third party evaluation team, HB150, 63M-1-3205, FY14-16, all one time: \$5M (K-5) \$3.5M (6-8) \$5M (9-12) FY17: \$3M ongoing (K-12)	<ul style="list-style-type: none"> Select one or more products that: Support math instruction Provide individualized instruction Self-adapting Support informal assessments Embed monitoring and feedback mechanisms Create process for school selection Provide professional development that trains educators on use of products Support independent evaluation 	<ul style="list-style-type: none"> Percent usage (overall and at fidelity) Increased likelihood of grade level proficiency as determined by SAGE scores Teacher satisfaction with qualitative feedback Student satisfaction with qualitative feedback LEA participation Competitive license cost 	<ul style="list-style-type: none"> 11 products selected 74 districts and charters 653 schools 193,213 students 78% usage 9% fidelity 21,414 surveys completed 	<ul style="list-style-type: none"> 9 products selected 51 districts and charters 556 schools 168,389 students 80% usage 49% fidelity 30,371 surveys completed 	<ul style="list-style-type: none"> Increase usage with fidelity Visit and support LEA's with low usage Visit LEA's with high usage to understand learning environment Continue teacher training Implement changes to contracts and RFP, with new funding Evaluate program effectiveness by grade level on a standardized measure 	<ul style="list-style-type: none"> Increased support for student success in math Increased support to teachers to supplement instruction Improved opportunities for intervention and personalized instruction Improved access to data to inform instructional design

Classroom, Organizational & FCC Grants				
Activity, Statute and Funding	Performance Measures	FY16 Performance Impact	FY17 Performance Goals	Outcomes
Classroom Grants, HB139 63M-1-3204, Operational budget	1) Budget contribution 2) # of teacher participants 3) Teacher feedback 4) # of students impacted 5) Cost per student 6) Teacher feedback	<ul style="list-style-type: none"> \$77,270 contributed 280 applicants, 61 awarded 9,883 students impacted \$7.81/student 	<ul style="list-style-type: none"> Measure student impact Inform STEM best practices to improve teacher practice in classrooms statewide Create a repository of great STEM ideas for teachers to pull from Showcase exemplar teachers 	<ul style="list-style-type: none"> Increased resources in classrooms Increased direct support of educators
Organizational Grants, HB139 63M-1-3204, Operational budget	1) Budget contribution 2) # of organizations supported 3) # of students impacted 4) Cost per student 5) Student feedback	<ul style="list-style-type: none"> \$30,425 contributed 16 organizations funded 4,519 students impacted \$6.73/student 	<ul style="list-style-type: none"> Provide unique STEM opportunities for students outside of the classroom 	<ul style="list-style-type: none"> Increased statewide access for students Increased community awareness
STEM Assembly Program (STEM Magic Show), HB139 63M-1-3204, Private funding	1) # of shows conducted 2) # of students impacted 3) Teacher and student feedback 4) Amount of private contribution	<ul style="list-style-type: none"> New program \$10,000 private donation to pilot 	<ul style="list-style-type: none"> Host at least 30 show Impact more than 20,000 students Maintain \$10,000 private donation 	<ul style="list-style-type: none"> Increased student awareness
Utah STEM Fest, HB139 63M-1-3204, \$17,251 operational	1) # of exhibitors 2) # of students attending 3) # of LEAs participating 4) # of attendees on family night 5) # of bus scholarships provided 6) Participant feedback 7) STEM AC contribution 8) Private contribution	<ul style="list-style-type: none"> 66 exhibitors approx. 17,000 students attending 78 LEAs participated approx. 3,500 attendees on family night 51 bus scholarships \$17,251 contributed \$137,000 private contribution 	<ul style="list-style-type: none"> >21,000 students >6,000 evening attendees at least 80 LEAs participating at least 60 bus scholarships 	<ul style="list-style-type: none"> Increased student awareness Greater connection to careers
Public Awareness, HB139 63M-1-3204	1) # of page views on website 2) # of new users on website 3) # of new sessions on website 4) # of Facebook page likes 5) # of Twitter followers 6) # of Instagram followers 7) # of LinkedIn followers 8) # of Google+ followers 9) Website bounce rate	<ul style="list-style-type: none"> Website: 106,517 page views; 33,325 new users; 47,271 sessions Social media: Facebook(1,540); Twitter (900); Instagram (225), LinkedIn (184); Google+ (24) 111% increase Low bounce rate 	<ul style="list-style-type: none"> Website: 106,517 page views; 33,325 new users; 47,271 sessions Social media: Facebook(1,540); Twitter (900); Instagram (225), LinkedIn (184); Google+ (24) 111% increase Low bounce rate 	<ul style="list-style-type: none"> Greater awareness of STEM Increased use of resources
Event Sponsorships, HB139 63M-1-3204, \$64,470 operational	1) Budget contribution 2) # of events sponsored 3) # of total participants 4) Participant feedback	<ul style="list-style-type: none"> \$64,470 contributed 26 events sponsored 63,321 participants 	<ul style="list-style-type: none"> 30 events 70,000 students 	<ul style="list-style-type: none"> Increased opportunity and access for students
Fairs, Camps and Competitions Grants, HB139 63M-1-3204, Operational budget	1) Budget contribution 2) # of student participants 3) Student feedback 4) Cost per student	<ul style="list-style-type: none"> \$217,740 contributed 1,113 student participants \$196/student 660 applicants 257 awarded 	<ul style="list-style-type: none"> Project on hold Re-examine management and cost effectiveness 	<ul style="list-style-type: none"> Greater access to activities and events Increased interest in STEM

Professional Learning					
Activity, Statute, Funding	Statutory	Performance Measures	FY16 Performance Impact	FY17 Performance Goals	Outcomes
Design and implement a PL program, HB150 63M-1-3209, FY14 –FY17, \$5M ongoing	<p>1) Select one or more product providers that provide professional learning support that:</p> <p>2) Allows for SBOE, district or school to define the application content and track results</p> <p>3) Provides access to automatic tools, resources and strategies including instructional materials with integrated STEM content</p> <p>4) Supports online learning communities, including giving and receiving feedback via uploaded video</p> <p>5) Track and report data on usage</p> <p><i>Includes video of highly effective STEM education teaching that:</i></p> <p>a) Covers a cross section of grade levels and subjects</p> <p>b) Works USBE to ensure that videos will include highly effective Utah STEM educators</p> <p>c) Allow for additional STEM content to be added</p> <p>d) May create hybrid or blended professional learning that allows for face-to-face learning</p>	<p>1) # of teachers participating</p> <p>2) # of grants awarded</p> <p>3) License usage, where appropriate (overall and fidelity)</p> <p>4) # of LEAs participating</p> <p>5) # of schools participating</p> <p>6) # of surveys returned for qualitative assessment</p> <p>7) # of teachers trained on license, where appropriate</p> <p>8) # of videos created</p> <p>9) Type of videos viewed</p> <p>10) Qualitative assessment with teacher feedback</p> <p>11) # of teacher videos uploaded</p> <p>12) Evaluate changes in classroom instruction between pre & post video shared by teachers</p> <p>13) Evaluation of student performance</p>	<ul style="list-style-type: none"> 1 product supported (1 dropped at end of FY15) 78 grants awarded 18,938 licenses provided (18,093 requested) 41 LEAs participating 581 schools 2,563 in product provider training 5,453 teachers used licenses 50 videos produced by product provider 258 surveys completed and submitted Summary of types of videos viewed in final report: key finding, 90% of videos viewed were classroom management Summary of teacher feedback in final evaluation report: key finding, disconnect in teachers versus administrator satisfaction 	<ul style="list-style-type: none"> Increase usage Continue teacher training Scale up 2.0 Look for ways to utilize Edvivate platform for other STEM AC projects (math, CTE etc.) Offer additional funds to support Edvivate usage with face to face STEM professional Learning Learning Experience pilot for Digital Math program teachers 	<ul style="list-style-type: none"> Improved classroom management Increased confidence in STEM instruction Increased ability to implement lessons that cross content areas Increase student understanding and engagement

Elementary STEM Endorsement					
Activity, Statute, Funding	Statutory	Performance Measures*	FY16 Performance Impact	FY17 Performance Goals	Outcomes
Create and Implement elementary STEM endorsement, HB150 63M-1-3208, FY14-18, \$1.5M (one time)	<ul style="list-style-type: none"> Collaborate with USBE Develop STEM endorsements Create and implement financial incentives Support incentives for higher education credit (district) or impact salary schedule (charter) 	1) # of teachers participating 2) # of LEAs participating 3) # of institutions of higher education (IHE) participating 4) # of teachers completing 5) qualitative assessment with teacher feedback (pre- and post surveys) 6) institution feedback on quality of instruction	<ul style="list-style-type: none"> 332 teachers participated 23 LEAs represented 7 institutions of higher education providing courses 	<ul style="list-style-type: none"> Document # of teachers that completed the endorsement sequence (retention rate) Review of Course Frameworks with intent for refinement based on implementation and evaluation Sharing of best practices amongst cohorts 	<ul style="list-style-type: none"> Greater awareness of STEM Improved integration of STEM across curriculum Creation of peer networks

STEM School Designation					
Funding	Statutory	STEM AC activity	FY16 Outcomes	FY17 Performance Goals	
	<ul style="list-style-type: none"> Cooperate with USBE Designate STEM schools Identify criteria Establish implementation plans 	<ul style="list-style-type: none"> Identify criteria USBE and STEM AC Board approve Create implementation plan Solicit applications Review applications with stakeholder review team 	<ul style="list-style-type: none"> 42 applications in first cohort 19 selected 	<ul style="list-style-type: none"> create network of awardees and applicants for support add to list of STEM designated schools create list of interested future applicants and provide application support 	

High School STEM Certification				
Activity, Statute, Funding	Performance Measures	FY16 Performance Impact	FY17 Performance Goals	Outcomes
Create certifications that are industry recognized, HB150 63M-1-3211, \$5M (one time)	<p>FY16</p> <ol style="list-style-type: none"> 1) # of students entering certification programs 2) Documentation of new emphasis areas for certifications 3) # of new programs created 4) # of students completing certification programs 5) # of internships completed 6) # of partners (secondary and post-secondary) 7) # of new industry partners <p>FY17</p> <ol style="list-style-type: none"> 1) # of new CS courses created 2) # of new CS teachers recruited (endorsements, code.org training, K-6 training for CS Fundamentals) 3) # of new students participating in CS courses (breakdown by 8-12 grades, approved courses; baseline will be established using current USBE enrollment data for FY16) 4) # of new outreach programs 5) # of students participating in outreach programs 6) hours of industry engagement (with financial match of time) 7) # of students participating in work-based learning activities 8) amount of private contribution (combined with match of volunteer time) 9) # of K-6 schools offering coding opportunities (e.g., Scratch, Hour of Code) 10) # of hours of industry instruction 11) # of students from underrepresented populations participating in all supported activities 	<ul style="list-style-type: none"> • 6,919 students participated in certification pathways • 4,791 completed certifications • 639 completed internships • 12 grants awarded • 17 LEA's participated • 14 universities and technical colleges participated • 44 industry partners 	<ol style="list-style-type: none"> 1) Increase the number of qualified CS teachers 2) Increase the number of CS courses in secondary 3) Increase out of school CS opportunities 4) Increase access to coding in K-6 5) Work with districts to identify key investments required to implement a CS curriculum. (Data based on CS RFG) 6) Improve industry engagement in the classroom 7) Increase the participation of underrepresented populations in CS courses 	<ul style="list-style-type: none"> • Continue to collect for impact data • Monitor sustainability • Leverage programs for other opportunities • Increase the number of teachers undergoing computing professional development • Greater employment opportunities for students in high demand STEM careers

7 th and 8 th Grade Applied Science Initiative (CTE)				
Activity, Statute, Funding	Statutory Goals	Performance Measures	Performance Impact FY 16	Outcomes
Support hands on instruction in 7 th and 8 th grade science courses, FY14-15:\$3.5M (one time)	<ul style="list-style-type: none"> Develop an applied science initiative for grades 7 and 8 that includes: <ul style="list-style-type: none"> Curriculum with instructional materials Hybrid or blended high quality PD that allows for face-to-face applied learning Hands on tools for applied science learning Using an RFP process the Center may select a consultant 	1) # of curriculum resources selected 2) # of participating LEAs 3) # of students impacted in 7 th and 8 th grade courses 4) teacher satisfaction using qualitative feedback 5) student satisfaction using qualitative feedback 6) # of teachers using curriculum materials	<ul style="list-style-type: none"> 4 products selected and resources allocated 2,815 licenses used* 49,853 students impacted (about 50% of 7th and 8th grade students) 74 schools participated 38 LEAs represented 3,218 surveys collected (3,120 students and 98 teachers) feedback from teachers and students included in FY16 annual report; key finding: the majority of teachers want to continue to use resources, students report to have a strong interest in STEM-related areas 	<ul style="list-style-type: none"> Increase access to hands on, applied learning for students Enhance problem-based learning Facilitate teacher-to-teacher training for lesson alignment

Utah STEM Bus - USB					
Activity, Statute, Funding	Statutory	Performance Measures	Performance Impact FY16	Performance Goals FY17	Outcomes
HB 150/2014 Line 37	Expands the scope of the STEM education technology program to more students	<ul style="list-style-type: none"> - Industry Participation in programs and funding -USB classes taught -statewide -Pre and post surveys of students and educators -Donations received through the STEM foundation -Number of Companies Engaged with USB -USB grants awarded to schools -Number of hours of volunteer support -Engagements with Schools, industry and community organizations 	<ul style="list-style-type: none"> -Partnered with 13 organizations for program development -Implemented 7 curriculum -Taught a total of 3,287 students in 132 classes at 19 schools, in 16 LEAs 	<ul style="list-style-type: none"> -Develop curriculum committee -Update current curriculum -Add 2-4 new curriculum -Teach in 40 schools 4,000 students -Present the Bus at 20 events 	<ul style="list-style-type: none"> -Increased demand for USB Programs -Increased community awareness of the USB -Increased interest in STEM education and careers

Utah STEM Foundation				
Activity, Statutory (HB150 63M-1-3203)	Performance Measures	FY16 Performance Impact	FY17 Performance Goals	Outcomes
<ul style="list-style-type: none"> Develop and implement programs authorized to Promote STEM Education; and Implementation of other STEM education objectives Solicit and receive contributions from a private organization for STEM education objectives Comply with Title 51, Chapter 7, State Money Management Act; Foster partnerships with industry partners to enhance STEM Education in Utah 	<ul style="list-style-type: none"> Private contributions for program support Private contributions for endowment 	<ul style="list-style-type: none"> Boeing Comcast IM Flash Larry H. Miller MHTN (in kind design work) Rockwell Collins Tesoro IHC VCBO (in kind design work) 	<ul style="list-style-type: none"> Ongoing outreach to community and industry leaders Leverage funding opportunities and program development Finalize Foundation Board Hold an inaugural Foundation and program event Create a strategic and communication plan Fundraising goal of (\$250,000 to \$500,000 – based on 1 person working 12-20 hours per week) 	<ul style="list-style-type: none"> Awarded \$1.5 Million (5 year grant) from Tesoro for the creation of the Utah STEM Bus UTA donated 2 transit buses and a transit van Pro-bono work from architecture firms for bus schematics Mentorship program created with students for bus schematics Greater industry involvement Increased support for STEM opportunities for students and teachers

Authorizing Code & Bills

U.C.A. 63M-1-3201-3211

The STEM (Science, Technology, Engineering and Math) Action Center prioritizes STEM education, which works to develop Utah's workforce of the future. The program drives research and implementation of STEM education best practices across Utah by coordinating STEM-related activities, creating and supporting STEM education, facilitating educator access to education tools, and aligning public STEM education with higher-education STEM activities.

In order to advance STEM initiatives, the STEM Action Center Board will use legislative funding to oversee several projects that align with K-12 education and support the Utah State Office of Education and higher education partners. These programs address issues that support outreach, recruitment, retention and student achievement

Additionally, the STEM Action Center will align technology and innovation with industry needs and higher education initiatives to ensure development of the future workforce. This will be a safeguard to the state's economic prosperity by ensuring there is a workforce ready to take on the high-quality and high-paying STEM related careers.

HB 139

SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS ACTION CENTER 2013 GENERAL SESSION STATE OF UTAH Chief Sponsor: Val L. Peterson Senate Sponsor: Stephen H. Urquhart

- 26 This bill creates educational programs for science, technology, engineering, and
27 mathematics (STEM).
28 Highlighted Provisions:
29 This bill:
30 creates a Science, Technology, Engineering, and Mathematics (STEM) Action
31 Center Board;
32 requires the STEM Action Center Board to:
33 establish a STEM Action Center; and
34 appoint an executive director to oversee administration of the STEM Action
35 Center;
36 requires the Governor's Office of Economic Development to staff the STEM Action
37 Center Board and the STEM Action Center;
38 requires the STEM Action Center Board to select providers, through a request for
39 proposals process, to provide education related instructional technology;
40 requires the STEM Action Center Board to work with private industry to obtain
41 private funding and support for the STEM Action Center;
42 as funding allows, requires the STEM Action Center Board to perform certain
43 duties related to the STEM Action Center;

requires the executive director to track student achievement and progress in STEM areas;

- requires the STEM Action Center Board to report to the Education Interim Committee, the Public Education Appropriations Subcommittee, and the State Board of Education once each year;
- creates the STEM education related technology program;
- allows the State Board of Education staff and STEM Action Center staff to award STEM education related instructional technology and related professional development to school districts and charter schools for instructional technology for STEM related education if certain conditions are met;
- specifies criteria to consider in selecting STEM education related instructional technology;
- provides that certain education related instructional technology may be acquired through a direct award or sole source procurement process for purposes of conducting a pilot; and
- eliminates certain duties of the State Advisory Council on Science and Technology related to science and technology fairs and camps.

Money Appropriated in this Bill:

- This bill appropriates in fiscal year 2014:
 - to Governor's Office of Economic Development - STEM Action Center, as an ongoing appropriation:
 - from the General Fund, \$1,500,000; and
 - to Governor's Office of Economic Development - STEM Action Center, as a one-time appropriation:
 - from the General Fund, \$8,500,000.

Other Special Clauses:

- This bill provides an effective date.

Utah Code Sections Affected:

AMENDS:

- 63M-1-608, as renumbered and amended by Laws of Utah 2008, Chapter 382

ENACTS:

- 63M-1-3201, Utah Code Annotated 1953
- 63M-1-3202, Utah Code Annotated 1953
- 63M-1-3203, Utah Code Annotated 1953
- 63M-1-3204, Utah Code Annotated 1953
- 63M-1-3205, Utah Code Annotated 1953
- 63M-1-3206, Utah Code Annotated 1953
- 63M-1-3207, Utah Code Annotated 1953

Be it enacted by the Legislature of the state of Utah:

Section 1. Section 63M-1-608 is amended to read:

63M-1-608. Science education program.

- (1) (a) There is established an informal science and technology education program within the Governor's Office of Economic Development.
- (b) The state science advisor shall act as the executive director of the program.
- (c) The State Advisory Council on Science and Technology shall advise the program, including:
 - (i) approving all money expended by the science and technology education program;
 - (ii) approving all operations of the program; and
 - (iii) making policies and procedures to govern the program.
- (2) The program may:
 - (a) provide informal science and technology-based education to elementary and

96 secondary students;
 97 (b) expose public education students to college level science and technology
 98 disciplines; and
 99 [(c) administer a science and technology camp program; and]
 100 [(d)] (c) provide other informal promotion of science and technology education in
 101 [this] the state[, including the direct sponsorship of science fairs and science olympiads].
 102 [(3) The science and technology camp program described under Subsection (2)(c) shall
 103 be:]
 104 [(a) provided exclusively for elementary and secondary students and their teachers;]
 105 [(b) established as a grant program for camp providers; and]
 106 [(c) administered based upon annual requests for proposals, a documented review
 107 process, and grant awards.]
 108 Section 2. Section 63M-1-3201 is enacted to read:
 109 63M-1-3201. Definitions.
 110 As used in this part:
 111 (1) "Board" means the STEM Action Center Board created in Section 63M-1-3202 .
 112 (2) "Educator" has the meaning defined in Section 53A-6-103 .
 113 (3) "Office" means the Governor's Office of Economic Development.
 114 (4) "Provider" means a provider, selected by staff of the board and staff of the Utah
 115 State Board of Education, on behalf of the board:
 116 (a) through a request for proposals process; or
 117 (b) through a direct award or sole source procurement process for a pilot described in
 118 Section 63M-1-3205 .
 119 (5) "STEM" means science, technology, engineering, and mathematics.
 120 (6) "STEM Action Center" means the center described in Section 63M-1-3204 .
 121 Section 3. Section 63M-1-3202 is enacted to read:
 122 63M-1-3202. STEM Action Center Board creation -- Membership.
 123 (1) There is created the STEM Action Center Board within the office, composed of the
 124 following members:
 125 (a) five private sector members who represent business, appointed by the governor;
 126 (b) the state superintendent of public instruction or the state superintendent of public
 127 instruction's designee;
 128 (c) the commissioner of higher education or the commissioner of higher education's
 129 designee;
 130 (d) one member appointed by the governor;
 131 (e) a member of the State Board of Education, chosen by the chair of the State Board of Education;
 132 (f) the executive director of the Governor's Office of Economic Development or the
 133 executive director of the Governor's Office of Economic Development's designee; and
 134 (g) the president of the Utah College of Applied Technology or the president of the
 135 Utah College of Applied Technology's designee.
 136 (2) (a) The private sector members appointed by the governor in Subsection (1)(a) shall
 137 represent a business whose primary focus is science, technology, or engineering.
 138 (b) Except as required by Subsection (2)(c), members appointed by the governor shall
 139 be appointed to four-year terms.
 140 (c) The length of terms of the members shall be staggered so that approximately half of
 141 the committee is appointed every two years.
 142 (d) The members may not serve more than two full consecutive terms except where the
 143 governor determines that an additional term is in the best interest of the state.
 144 (e) When a vacancy occurs in the membership for any reason, the replacement shall be
 145 appointed for the unexpired term.
 146 (3) Attendance of a simple majority of the members constitutes a quorum for the
 147 transaction of official committee business.
 148
 149

(4) Formal action by the committee requires a majority vote of a quorum.

(5) A member may not receive compensation or benefits for the member's service, but may receive per diem and travel expenses in accordance with:

- (a) Section 63A-3-106 ;
- (b) Section 63A-3-107 ; and
- (c) rules made by the Division of Finance pursuant to Sections 63A-3-106 and 63A-3-107 .

(6) The governor shall select the chair of the board to serve a one-year term.

(7) The executive director of the Governor's Office of Economic Development or the executive director of the Governor's Office of Economic Development's designee shall serve as the vice chair of the board.

(8) The state science advisor described in Section 63M-1-606 and the office shall provide staff support to the board.

Section 4. Section 63M-1-3203 is enacted to read:

63M-1-3203. STEM Action Center Board -- Duties.

(1) The board shall:

- (a) establish a STEM Action Center program to:
 - (i) coordinate STEM activities in the state among the following stakeholders:
 - (A) the State Board of Education;
 - (B) school districts and charter schools;
 - (C) the State Board of Regents;
 - (D) institutions of higher education;
 - (E) parents of home-schooled students; and
 - (F) other state agencies;
 - (ii) align public education STEM activities with higher education STEM activities; and
 - (iii) create and coordinate best practices among public education and higher education;
- (b) with the consent of the Senate, appoint an executive director to oversee the administration of the STEM Action Center;
- (c) select a physical location for the STEM Action Center;
- (d) strategically engage industry and business entities to cooperate with the board:
 - (i) to support professional development and provide other assistance for educators and students; and
 - (ii) to provide private funding and support for the STEM Action Center;
- (e) give direction to the STEM Action Center and the providers selected through a request for proposals process pursuant to this part; and
- (f) work to meet the following expectations:
 - (i) that at least 50 educators are implementing best practice learning tools in classrooms per each product specialist or manager working with the STEM Action Center;
 - (ii) performance change in student achievement in each classroom working with a STEM Action Center product specialist or manager; and
 - (iii) that students from at least 50 high schools participate in the STEM competitions, fairs, and camps described in Subsection 63M-1-3204 (2)(d).

(2) The board may:

- (a) enter into contracts for the purposes of this part;
- (b) apply for, receive, and disburse funds, contributions, or grants from any source for the purposes set forth in this part;
- (c) employ, compensate, and prescribe the duties and powers of individuals necessary to execute the duties and powers of the board;
- (d) prescribe the duties and powers of the STEM Action Center providers; and
- (e) in accordance with Title 63G, Chapter 3, Utah Administrative Rulemaking Act, make rules to administer this part.

Section 5. Section 63M-1-3204 is enacted to read:

202 63M-1-3204. STEM Action Center.
 203 (1) As funding allows, the board shall:
 204 (a) establish a STEM Action Center;
 205 (b) ensure that the STEM Action Center:
 206 (i) is accessible by the public; and
 207 (ii) includes the components described in Subsection (2);
 208 (c) work cooperatively with the State Board of Education to acquire technology and
 209 select schools as described in Sections 63M-1-3205 and 63M-1-3206 ; and
 210 (d) engage private entities to provide financial support or employee time for STEM
 211 activities in schools in addition to what is currently provided by private entities.
 212 (2) As funding allows, the executive director of the STEM Action Center shall:
 213 (a) support professional development for educators regarding education related
 214 instructional technology that supports STEM education;
 215 (b) ensure that the STEM Action Center acts as a research and development center for
 216 education related instructional technology acquired through a request for proposals process
 217 described in Section 63M-1-3205 ;
 218 (c) review and acquire STEM education related technology for:
 219 (i) educator professional development;
 220 (ii) assessment, data collection, analysis, and reporting; and
 221 (iii) public school instruction;
 222 (d) facilitate participation in interscholastic STEM related competitions, fairs, and
 223 camps;
 224 (e) engage private industry in the development and maintenance of the STEM Action
 225 Center;
 226 (f) use resources to bring the latest STEM education learning tools into public
 227 education classrooms;
 228 (g) identify at least 10 best practice innovations used in Utah schools that have resulted
 229 in at least 80% of students performing at grade level in STEM areas;
 230 (h) identify best practices being used outside the state and implement selected practices
 231 through a pilot program;
 232 (i) identify:
 233 (i) three learning tools for kindergarten through grade 6 identified as best practices; and
 234 (ii) three learning tools per STEM subject for grades 7 through 12 identified as best
 235 practices;
 236 (j) provide a Utah best practices database, including best practices from public
 237 education, higher education, the Utah Education Network, and other STEM related entities;
 238 (k) keep track of the following items related to the best practices database described in
 239 Subsection (2)(j):
 240 (i) how the best practices database is being used; and
 241 (ii) how many individuals are using the database, including the demographics of the
 242 users, if available;
 243 (l) join and participate in a national STEM network;
 244 (m) identify performance changes linked to use of the best practices database described
 245 in Subsection (2)(j);
 246 (n) work cooperatively with the State Board of Education to designate schools as
 247 STEM schools, where the schools have agreed to adopt a plan of STEM implementation in
 248 alignment with criteria set by the State Board of Education and the board;
 249 (o) support best methods of professional development, including methods of
 250 professional development that reduce cost and increase effectiveness, to help educators learn
 251 how to most effectively implement best practice learning tools in classrooms;
 252 (p) recognize a high school's achievement in the STEM competitions, fairs, and camps
 253 described in Subsection (2)(d);

(q) send student results from STEM competitions, fairs, and camps described in Subsection (2)(d) to media and ask the media to report on them;

(r) develop and distribute STEM toolkits to parents of students being served by the STEM Action Center;

(s) support targeted professional development for improved instruction in STEM in grades 6, 7, and 8, including:

- (i) improved instructional materials that are dynamic and engaging for students;
- (ii) targeted instruction for students who traditionally avoid enrolling in STEM courses;
- (iii) introduction of engaging engineering courses; and
- (iv) introduction of other research-based methods that support student achievement in STEM areas; and
- (t) ensure that an online college readiness assessment tool be accessible by:
 - (i) public education students; and
 - (ii) higher education students.

(3) The board may prescribe other duties for the STEM Action Center in addition to the responsibilities described in this section.

(4) (a) The executive director shall track and compare the student performance of students participating in a STEM Action Center program to all other similarly situated students in the state, in the following STEM related activities, at the beginning and end of each year:

- (i) public education high school graduation rates;
- (ii) the number of students taking a remedial mathematics course at an institution of higher education described in Section 53B-2-101 ;
- (iii) the number of students who graduate from a Utah public school and begin a postsecondary education program; and
- (iv) the number of students, as compared to all similarly situated students, who are performing at grade level in STEM classes.

(b) The State Board of Education and the State Board of Regents shall provide information to the board to assist the board in complying with the requirements of Subsection (4)(a) if allowed under federal law.

Section 6. Section 63M-1-3205 is enacted to read:

63M-1-3205. Acquisition of STEM education related instructional technology program -- Research and development of education related instructional technology through a pilot program.

(1) For purposes of this section:

- (a) "Pilot" means a pilot of the program.
- (b) "Program" means the STEM education related instructional technology program created in Subsection (2).

(2) (a) There is created the STEM education related instructional technology program to provide public schools the STEM education related instructional technology described in Subsection (3).

(b) On behalf of the board, the staff of the board and the staff of the State Board of Education shall collaborate and may select one or more providers, through a request for proposals process, to provide STEM education related instructional technology to school districts and charter schools.

(c) On behalf of the board, the staff of the board and the staff of the State Board of Education shall consider and may accept an offer from a provider in response to the request for proposals described in Subsection (2)(b) even if the provider did not participate in a pilot described in Subsection (5).

(3) The STEM education related instructional technology shall:

- (a) support mathematics instruction for students in grade 6, 7, or 8; or
- (b) support mathematics instruction for secondary students to prepare the secondary

306 students for college mathematics courses.

307 (4) In selecting a provider for STEM education related instructional technology to

308 support mathematics instruction for students in grade 6, 7, or 8 as described in Subsection

309 (3)(a), the board shall consider the following criteria:

310 (a) the technology contains individualized instructional support for skills and

311 understanding of the core standards in mathematics;

312 (b) the technology is self-adapting to respond to the needs and progress of the learner;

313 and

314 (c) the technology provides opportunities for frequent, quick, and informal assessments

315 and includes an embedded progress monitoring tool and mechanisms for regular feedback to

316 students and teachers.

317 (5) Before issuing a request for proposals described in Subsection (2), on behalf of the

318 board, the staff of the board and the staff of the State Board of Education shall collaborate and

319 may:

320 (a) conduct a pilot of the program to test and select providers for the program;

321 (b) select at least two providers through a direct award or sole source procurement

322 process for the purpose of conducting the pilot; and

323 (c) select schools to participate in the pilot.

324 (6) (a) A contract with a provider for STEM education related instructional technology

325 may include professional development for full deployment of the STEM education related

326 instructional technology.

327 (b) No more than 10% of the money appropriated for the program may be used to

328 provide professional development related to STEM education related instructional technology

329 in addition to the professional development described in Subsection (6)(a).

330 Section 7. Section 63M-1-3206 is enacted to read:

331 63M-1-3206. Distribution of STEM education instructional technology to schools.

332 (1) Subject to legislative appropriations, on behalf of the board, the staff of the board

333 and the staff of the State Board of Education shall collaborate and shall:

334 (a) distribute STEM education related instructional technology described in Section

335 63M-1-3205 to school districts and charter schools; and

336 (b) provide related professional development to the school districts and charter schools

337 that receive STEM education related instructional technology.

338 (2) A school district or charter school may apply to the board, through a competitive

339 process, to receive STEM education related instructional technology from the board.

340 (3) A school district or charter school that receives STEM education related

341 instructional technology as described in this section shall provide the school district's or charter

342 school's own computer hardware.

343 Section 8. Section 63M-1-3207 is enacted to read:

344 63M-1-3207. Report to Legislature and the State Board of Education.

345 (1) The board shall report the progress of the STEM Action Center, including the

346 information described in Subsection (2), to the following groups once each year:

347 (a) the Education Interim Committee;

348 (b) the Public Education Appropriations Subcommittee; and

349 (c) the State Board of Education.

350 (2) The report described in Subsection (1) shall include information that demonstrates

351 the effectiveness of the program, including:

352 (a) the number of educators receiving professional development;

353 (b) the number of students receiving services from the STEM Action Center;

354 (c) a list of the providers selected pursuant to this part;

355 (d) a report on the STEM Action Center's fulfillment of its duties described in

356 Subsection 63M-1-3204 ; and

357 (e) student performance of students participating in a STEM Action Center program as

collected in Subsection 63M-1-3204 (4).

Section 9. Appropriation.

Under the terms and conditions of Title 63J, Chapter 1, Budgetary Procedures Act, for the fiscal year beginning July 1, 2013, and ending June 30, 2014, the following sums of money are appropriated from resources not otherwise appropriated, or reduced from amounts previously appropriated, out of the funds or accounts indicated. These sums of money are in addition to any amounts previously appropriated for fiscal year 2014.

To Governor's Office of Economic Development - STEM Action Center

From General Fund \$1,500,000

From General Fund, one-time \$8,500,000

Schedule of Programs:

STEM Action Center \$10,000,000

The Legislature intends that:

(1) up to \$1,500,000 of the appropriation for STEM Action Center be used to establish a STEM Action Center as described in Section 63M-1-3204 ;

(2) at least \$5,000,000 of the appropriation for STEM Action Center be used for STEM education related instructional technology and related professional development to support mathematics instruction for students in grades 6, 7, or 8 as described in Subsection 63M-1-3205 (3)(a) and Section 63M-1-3206 , and related assessment, data collection, analysis, and reporting;

(3) at least \$3,500,000 of the appropriation for STEM Action Center be used for STEM education related instructional technology and related professional development to support mathematics instruction for secondary students to prepare the secondary students for college mathematics courses as described in Subsection 63M-1-3205 (3)(b) and Section 63M-1-3206 , and related assessment, data collection, analysis, and reporting;

(4) that the appropriation described in Subsection (1):

(a) be ongoing; and

(b) not lapse at the close of fiscal year 2014; and

(5) that the appropriations described in Subsections (2) and (3):

(a) be one-time; and

(b) not lapse at the close of fiscal year 2014.

Section 10. Effective date.

(1) Except as provided in Subsection (2), if approved by two-thirds of all the members elected to each house, this bill takes effect upon approval by the governor, or the day following the constitutional time limit of Utah Constitution Article VII, Section 8, without the governor's signature, or in the case of a veto, the date of veto override.

(2) Uncodified Section 9, Appropriation, takes effect on July 1, 2013.

HB150

SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS AMENDMENTS 2014 GENERAL SESSION STATE OF UTAH

Chief Sponsor: Val L. Peterson

Senate Sponsor: Stephen H. Urquhart

25 This bill amends and enacts provisions relating to the Science, Technology,
26 Engineering, and Mathematics Action Center.

27 Highlighted Provisions:

28 This bill:

- 29 . defines terms;
- 30 . adds members to the STEM Action Center Board;
- 31 . allows the STEM Action Center Board to create a foundation;
- 32 . specifies that the STEM Action Center shall support high quality professional
33 development for educators related to STEM education in kindergarten through
34 grade 12;
- 35 . allows the STEM Action Center to further STEM education with nontechnological
36 means;
- 37 . expands the scope of the STEM education related technology program to more
38 students;
- 39 . creates the STEM education endorsements and incentive program, and requires the
40 State Board of Education to make rules regarding the endorsements;
- 41 . requires the STEM Action Center to select technology providers to create a certain
42 professional development application;
- 43 . requires the STEM Action Center to create in-person STEM education high quality
44 professional development;
- 45 . creates the STEM education middle school applied science initiative;
- 46 . creates the high school STEM education initiative; and
- 47 . makes technical changes.

48 Money Appropriated in this Bill:

49 This bill appropriates in fiscal year 2015:

- 50 . to the Governor's Office of Economic Development - STEM Action Center, as an
51 ongoing appropriation:
- 52 . from the General Fund, \$5,000,000; and
- 53 . to the Governor's Office of Economic Development - STEM Action Center, as a
54 one-time appropriation:
- 55 . from the General Fund, \$15,000,000.

56 Other Special Clauses:

57 This bill provides an effective date.

58 Utah Code Sections Affected:

59 AMENDS:

- 60 63M-1-3201 , as enacted by Laws of Utah 2013, Chapter 336
- 61 63M-1-3202 , as enacted by Laws of Utah 2013, Chapter 336
- 62 63M-1-3203 , as enacted by Laws of Utah 2013, Chapter 336
- 63 63M-1-3204 , as enacted by Laws of Utah 2013, Chapter 336
- 64 63M-1-3205 , as enacted by Laws of Utah 2013, Chapter 336
- 65 63M-1-3207 , as enacted by Laws of Utah 2013, Chapter 336

ENACTS:

63M-1-3208 , Utah Code Annotated 1953
63M-1-3209 , Utah Code Annotated 1953
63M-1-3210 , Utah Code Annotated 1953
63M-1-3211 , Utah Code Annotated 1953

Be it enacted by the Legislature of the state of Utah:

Section 1. Section 63M-1-3201 is amended to read:

63M-1-3201. Definitions.

As used in this part:

(1) "Board" means the STEM Action Center Board created in Section 63M-1-3202 .

(2) "Educator" has the meaning defined in Section 53A-6-103 .

(3) "High quality professional development" means professional development that meets high quality standards developed by the State Board of Education.

[(3)] (4) "Office" means the Governor's Office of Economic Development.

[(4)] (5) "Provider" means a provider, selected by staff of the board and staff of the Utah State Board of Education, on behalf of the board:

(a) through a request for proposals process; or

(b) through a direct award or sole source procurement process for a pilot described in Section 63M-1-3205 .

[(5)] (6) "STEM" means science, technology, engineering, and mathematics.

[(6)] (7) "STEM Action Center" means the center described in Section 63M-1-3204 .

Section 2. Section 63M-1-3202 is amended to read:

63M-1-3202. STEM Action Center Board creation -- Membership.

(1) There is created the STEM Action Center Board within the office, composed of the following members:

(a) [five] six private sector members who represent business, appointed by the governor;

(b) the state superintendent of public instruction or the state superintendent of public instruction's designee;

(c) the commissioner of higher education or the commissioner of higher education's designee;

(d) one member appointed by the governor;

(e) a member of the State Board of Education, chosen by the chair of the State Board of Education;

(f) the executive director of the Governor's Office of Economic Development or the executive director of the Governor's Office of Economic Development's designee; [and]

(g) the president of the Utah College of Applied Technology or the president of the Utah College of Applied Technology's designee[.]; and

(h) one member who has a degree in engineering and experience working in a government military installation, appointed by the governor.

(2) (a) The private sector members appointed by the governor in Subsection (1)(a) shall represent a business or trade association whose primary focus is science, technology, or engineering.

(b) Except as required by Subsection (2)(c), members appointed by the governor shall be appointed to four-year terms.

(c) The length of terms of the members shall be staggered so that approximately half of the committee is appointed every two years.

(d) The members may not serve more than two full consecutive terms except where the governor determines that an additional term is in the best interest of the state.

(e) When a vacancy occurs in the membership for any reason, the replacement shall be appointed for the unexpired term.

118 (3) Attendance of a simple majority of the members constitutes a quorum for the
 119 transaction of official committee business.

120 (4) Formal action by the committee requires a majority vote of a quorum.

121 (5) A member may not receive compensation or benefits for the member's service, but
 122 may receive per diem and travel expenses in accordance with:

123 (a) Section 63A-3-106 ;
 124 (b) Section 63A-3-107 ; and
 125 (c) rules made by the Division of Finance pursuant to Sections 63A-3-106 and
 126 63A-3-107 .

127 (6) The governor shall select the chair of the board to serve a one-year term.

128 (7) The executive director of the Governor's Office of Economic Development or the
 129 executive director of the Governor's Office of Economic Development's designee shall serve as
 130 the vice chair of the board.

131 [(8) The state science advisor described in Section 63M-1-606 and the office shall
 132 provide staff support to the board.]

133 Section 3. Section 63M-1-3203 is amended to read:
 134 63M-1-3203. STEM Action Center Board -- Duties.

135 (1) The board shall:

136 (a) establish a STEM Action Center program to:

137 (i) coordinate STEM activities in the state among the following stakeholders:

138 (A) the State Board of Education;
 139 (B) school districts and charter schools;
 140 (C) the State Board of Regents;
 141 (D) institutions of higher education;
 142 (E) parents of home-schooled students; and
 143 (F) other state agencies;

144 (ii) align public education STEM activities with higher education STEM activities; and
 145 (iii) create and coordinate best practices among public education and higher education;

146 (b) with the consent of the Senate, appoint an executive director to oversee the
 147 administration of the STEM Action Center;

148 (c) select a physical location for the STEM Action Center;

149 (d) strategically engage industry and business entities to cooperate with the board:

150 (i) to support high quality professional development and provide other assistance for
 151 educators and students; and

152 (ii) to provide private funding and support for the STEM Action Center;

153 (e) give direction to the STEM Action Center and the providers selected through a
 154 request for proposals process pursuant to this part; and

155 (f) work to meet the following expectations:

156 (i) that at least 50 educators are implementing best practice learning tools in
 157 classrooms per each product specialist or manager working with the STEM Action Center;

158 (ii) performance change in student achievement in each classroom working with a
 159 STEM Action Center product specialist or manager; and

160 (iii) that students from at least 50 high schools participate in the STEM competitions,
 161 fairs, and camps described in Subsection 63M-1-3204 (2)(d).

162 (2) The board may:

163 (a) enter into contracts for the purposes of this part;

164 (b) apply for, receive, and disburse funds, contributions, or grants from any source for
 165 the purposes set forth in this part;

166 (c) employ, compensate, and prescribe the duties and powers of individuals necessary
 167 to execute the duties and powers of the board;

168 (d) prescribe the duties and powers of the STEM Action Center providers; and
 169 (e) in accordance with Title 63G, Chapter 3, Utah Administrative Rulemaking Act,

make rules to administer this part.

(3) The board may establish a foundation to assist in:

(a) the development and implementation of the programs authorized under this part to promote STEM education; and

(b) implementation of other STEM education objectives described in this part.

(4) A foundation established by the board under Subsection (3):

(a) may solicit and receive contributions from a private organization for STEM education objectives described in this part;

(b) shall comply with Title 51, Chapter 7, State Money Management Act;

(c) does not have power or authority to incur contractual obligations or liabilities that constitute a claim against public funds;

(d) may not exercise executive or administrative authority over the programs or other activities described in this part, except to the extent specifically authorized by the board;

(e) shall provide the board with information detailing transactions and balances of funds managed for the board; and

(f) may not:

(i) engage in lobbying activities;

(ii) attempt to influence legislation; or

(iii) participate in any campaign activity for or against:

(A) a political candidate; or

(B) an initiative, referendum, proposed constitutional amendment, bond, or any other ballot proposition submitted to the voters.

(5) Money donated to a foundation established under Subsection (3) may be accounted for in an expendable special revenue fund.

Section 4. Section 63M-1-3204 is amended to read:

63M-1-3204. STEM Action Center.

(1) As funding allows, the board shall:

(a) establish a STEM Action Center;

(b) ensure that the STEM Action Center:

(i) is accessible by the public; and

(ii) includes the components described in Subsection (2);

(c) work cooperatively with the State Board of Education to [acquire technology and select schools]:

(i) further STEM education; and

(ii) ensure best practices are implemented as described in Sections 63M-1-3205 and 63M-1-3206 ; and

(d) engage private entities to provide financial support or employee time for STEM activities in schools in addition to what is currently provided by private entities.

(2) As funding allows, the executive director of the STEM Action Center shall:

(a) support high quality professional development for educators regarding [education related instructional technology that supports] STEM education;

(b) ensure that the STEM Action Center acts as a research and development center for STEM education [related instructional technology acquired] through a request for proposals process described in Section 63M-1-3205 ;

(c) review and acquire STEM education related [technology] materials and products for:

(i) [educator] high quality professional development;

(ii) assessment, data collection, analysis, and reporting; and

(iii) public school instruction;

(d) facilitate participation in interscholastic STEM related competitions, fairs, [and] camps, and STEM education activities;

(e) engage private industry in the development and maintenance of the STEM Action

Center and STEM Action Center projects;

- (f) use resources to bring the latest STEM education learning tools into public education classrooms;
- (g) identify at least 10 best practice innovations used in Utah [schools] that have resulted in at least 80% of students performing at grade level in STEM areas;
- (h) identify best practices being used outside the state and, as appropriate, develop and implement selected practices through a pilot program;
- (i) identify:
 - (i) [three] learning tools for kindergarten through grade 6 identified as best practices; and
 - (ii) [three] learning tools [per STEM subject] for grades 7 through 12 identified as best practices;
- (j) provide a Utah best practices database, including best practices from public education, higher education, the Utah Education Network, and other STEM related entities;
- (k) keep track of the following items related to the best practices database described in Subsection (2)(j):
 - (i) how the best practices database is being used; and
 - (ii) how many individuals are using the database, including the demographics of the users, if available;
- (l) as appropriate, join and participate in a national STEM network;
- (m) identify performance changes linked to use of the best practices database described in Subsection (2)(j);
- (n) work cooperatively with the State Board of Education to designate schools as STEM schools, where the schools have agreed to adopt a plan of STEM implementation in alignment with criteria set by the State Board of Education and the board;
- (o) support best methods of high quality professional development[,] for STEM education in kindergarten through grade 12, including methods of high quality professional development that reduce cost and increase effectiveness, to help educators learn how to most effectively implement best practice learning tools in classrooms;
- (p) recognize a high school's achievement in the STEM competitions, fairs, and camps described in Subsection (2)(d);
- (q) send student results from STEM competitions, fairs, and camps described in Subsection (2)(d) to media and ask the media to report on them;
- (r) develop and distribute STEM [toolkits] information to parents of students being served by the STEM Action Center;
- (s) support targeted high quality professional development for improved instruction in STEM [in grades 6, 7, and 8] education, including:
 - (i) improved instructional materials that are dynamic and engaging for students;
 - [(ii) targeted instruction for students who traditionally avoid enrolling in STEM courses;]
 - [(iii) introduction of engaging engineering courses; and]
 - (ii) use of applied instruction; and
 - [(iv)] (iii) introduction of other research-based methods that support student achievement in STEM areas; and
- (t) ensure that an online college readiness assessment tool be accessible by:
 - (i) public education students; and
 - (ii) higher education students.

(3) The board may prescribe other duties for the STEM Action Center in addition to the responsibilities described in this section.

(4) (a) The executive director shall track and compare the student performance of students participating in a STEM Action Center program to all other similarly situated students in the state, in the following STEM related activities, at the beginning and end of each year:

(i) public education high school graduation rates;

(ii) the number of students taking a remedial mathematics course at an institution of higher education described in Section 53B-2-101 ;

(iii) the number of students who graduate from a Utah public school and begin a postsecondary education program; and

(iv) the number of students, as compared to all similarly situated students, who are performing at grade level in STEM classes.

(b) The State Board of Education and the State Board of Regents shall provide information to the board to assist the board in complying with the requirements of Subsection (4)(a) if allowed under federal law.

Section 5. Section 63M-1-3205 is amended to read:

63M-1-3205. Acquisition of STEM education related instructional technology program -- Research and development of education related instructional technology through a pilot program.

(1) For purposes of this section:

(a) "Pilot" means a pilot of the program.

(b) "Program" means the STEM education related instructional technology program created in Subsection (2).

(2) (a) There is created the STEM education related instructional technology program to provide public schools the STEM education related instructional technology described in Subsection (3).

(b) On behalf of the board, the staff of the board and the staff of the State Board of Education shall collaborate and may select one or more providers, through a request for proposals process, to provide STEM education related instructional technology to school districts and charter schools.

(c) On behalf of the board, the staff of the board and the staff of the State Board of Education shall consider and may accept an offer from a provider in response to the request for proposals described in Subsection (2)(b) even if the provider did not participate in a pilot described in Subsection (5).

(3) The STEM education related instructional technology shall:

(a) support mathematics instruction for students in [grade 6, 7, or 8; or]:

(i) kindergarten through grade 6; or

(ii) grades 7 and 8; or

(b) support mathematics instruction for secondary students to prepare the secondary students for college mathematics courses.

(4) In selecting a provider for STEM education related instructional technology to support mathematics instruction for the students [in grade 6, 7, or 8 as] described in Subsection (3)(a), the board shall consider the following criteria:

(a) the technology contains individualized instructional support for skills and understanding of the core standards in mathematics;

(b) the technology is self-adapting to respond to the needs and progress of the learner; and

(c) the technology provides opportunities for frequent, quick, and informal assessments and includes an embedded progress monitoring tool and mechanisms for regular feedback to students and teachers.

(5) Before issuing a request for proposals described in Subsection (2), on behalf of the board, the staff of the board and the staff of the State Board of Education shall collaborate and may:

(a) conduct a pilot of the program to test and select providers for the program;

(b) select at least two providers through a direct award or sole source procurement process for the purpose of conducting the pilot; and

(c) select schools to participate in the pilot.

326 (6) (a) A contract with a provider for STEM education related instructional technology
 327 may include professional development for full deployment of the STEM education related
 328 instructional technology.

329 (b) No more than 10% of the money appropriated for the program may be used to
 330 provide professional development related to STEM education related instructional technology
 331 in addition to the professional development described in Subsection (6)(a).

332 Section 6. Section 63M-1-3207 is amended to read:
 333 63M-1-3207. Report to Legislature and the State Board of Education.

334 (1) The board shall report the progress of the STEM Action Center, including the
 335 information described in Subsection (2), to the following groups once each year:

336 (a) the Education Interim Committee;
 337 (b) the Public Education Appropriations Subcommittee; and
 338 (c) the State Board of Education.

339 (2) The report described in Subsection (1) shall include information that demonstrates
 340 the effectiveness of the program, including:

341 (a) the number of educators receiving high quality professional development;
 342 (b) the number of students receiving services from the STEM Action Center;
 343 (c) a list of the providers selected pursuant to this part;
 344 (d) a report on the STEM Action Center's fulfillment of its duties described in
 345 Subsection 63M-1-3204 ; and

346 (e) student performance of students participating in a STEM Action Center program as
 347 collected in Subsection 63M-1-3204 (4).

348 Section 7. Section 63M-1-3208 is enacted to read:
 349 63M-1-3208. STEM education endorsements and incentive program.

350 (1) The State Board of Education shall collaborate with the STEM Action Center to:

351 (a) develop STEM education endorsements; and
 352 (b) create and implement financial incentives for:

353 (i) an educator to earn an elementary or secondary STEM education endorsement
 354 described in Subsection (1)(a); and
 355 (ii) a school district or a charter school to have STEM endorsed educators on staff.

356 (2) In accordance with Title 63G, Chapter 3, Utah Administrative Rulemaking Act, the
 357 State Board of Education shall make rules to establish how a STEM education endorsement
 358 incentive described in Subsection (1)(a) will be valued on a salary scale for educators.

359 Section 8. Section 63M-1-3209 is enacted to read:
 360 63M-1-3209. Acquisition of STEM education high quality professional
 361 development.

362 (1) The STEM Action Center shall, through a request for proposals process, select
 363 technology providers for the purpose of providing a STEM education high quality professional
 364 development application.

365 (2) The high quality professional development application described in Subsection (1)
 366 shall:

367 (a) allow the State Board of Education, a school district, or a school to define the
 368 application's input and track results of the high quality professional development;
 369 (b) allow educators to access automatic tools, resources, and strategies;
 370 (c) allow educators to work in online learning communities, including giving and
 371 receiving feedback via uploaded video;
 372 (d) track and report data on the usage of the components of the application's system
 373 and the relationship to improvement in classroom instruction;
 374 (e) include video examples of highly effective STEM education teaching that:
 375 (i) cover a cross section of grade levels and subjects;
 376 (ii) under the direction of the State Board of Education, include videos of highly
 377 effective Utah STEM educators; and

(iii) contain tools to help educators implement what they have learned; and
(f) allow for additional STEM education video content to be added.
(3) In addition to the high quality professional development application described in Subsections (1) and (2), the STEM Action Center may create STEM education hybrid or blended high quality professional development that allows for face-to-face applied learning.

Section 9. Section 63M-1-3210 is enacted to read:
63M-1-3210. STEM education middle school applied science initiative.
(1) The STEM Action Center shall develop an applied science initiative for students in grades 7 and 8 that includes:

- (a) a STEM applied science curriculum with instructional materials;
- (b) STEM hybrid or blended high quality professional development that allows for face-to-face applied learning; and
- (c) hands-on tools for STEM applied science learning.

(2) The STEM Action Center may, through a request for proposals process, select a consultant to assist in developing the initiative described in Subsection (1).

Section 10. Section 63M-1-3211 is enacted to read:
63M-1-3211. High school STEM education initiative.

(1) Subject to legislative appropriations, after consulting with State Board of Education staff, the STEM Action Center shall award grants to school districts and charter schools to fund STEM related certification for high school students.

(2) (a) A school district or charter school may apply for a grant from the STEM Action Center, through a competitive process, to fund the school district's or charter school's STEM related certification training program.

(b) A school district's or charter school's STEM related certification training program shall:

- (i) prepare high school students to be job ready for available STEM related positions of employment; and
- (ii) when a student completes the program, result in the student gaining a nationally industry-recognized employer STEM related certification.

(3) A school district or charter school may partner with one or more of the following to provide a STEM related certification program:

- (a) a Utah College of Applied Technology college campus;
- (b) Salt Lake Community College;
- (c) Snow College; or
- (d) a private sector employer.

Section 11. Appropriation.
Under the terms and conditions of Title 63J, Chapter 1, Budgetary Procedures Act, for the fiscal year beginning July 1, 2014, and ending June 30, 2015, the following sums of money are appropriated from resources not otherwise appropriated, or reduced from amounts previously appropriated, out of the funds or accounts indicated. These sums of money are in addition to any amounts previously appropriated for fiscal year 2015.

To Governor's Office of Economic Development - STEM Action Center	
From General Fund	\$5,000,000
From General Fund, One-time	\$15,000,000
Schedule of Programs:	
STEM Action Center	\$20,000,000

The Legislature intends that:

- (1) up to \$5,000,000 of the appropriation for the STEM Action Center program be used for STEM education related instructional technology and related professional development to support mathematics instruction as described in Subsection 63M-1-3205 (3)(a)(i) and Section 63M-1-3206, and related assessment, data collection, analysis, and reporting;
- (2) up to \$1,500,000 of the appropriation for the STEM Action Center program be used

430 for developing the STEM education endorsements and related incentive program described in
431 Section 63M-1-3208;
432 (3) up to \$5,000,000 of the appropriation for the STEM Action Center program be used
433 for providing a STEM education high quality professional development application as
434 described in Section 63M-1-3209;
435 (4) up to \$3,500,000 of the appropriation for the STEM Action Center program be used
436 to fund the STEM education middle school applied science initiative described in Section
437 63M-1-3210;
438 (5) up to \$5,000,000 of the appropriation for the STEM Action Center program be used
439 to fund the high school STEM education initiative described in Section 63M-1-3211 ;
440 (6) the appropriations described in Subsections (1), (2), (4), and (5):
441 (a) are one-time; and
442 (b) not lapse at the close of fiscal year 2015; and
443 (7) the appropriation described in Subsection (3):
444 (a) is ongoing; and
445 (b) not lapse at the close of fiscal year 2015.
446 Section 12. Effective date.
447 (1) Except as provided in Subsection (2), if approved by two-thirds of all the members
448 elected to each house, this bill takes effect upon approval by the governor, or the day following
449 the constitutional time limit of Utah Constitution, Article VII, Section 8, without the governor's
450 signature, or in the case of a veto, the date of veto override.
451 (2) Uncodified Section 11, Appropriation, takes effect on July 1, 2014.

STEM PROGRAM AMENDMENTS 2016 GENERAL SESSION STATE OF UTAH Chief Sponsor: Val L. Peterson Senate Sponsor: Stephen H. Urquhart

LONG TITLE

General Description:

This bill modifies provisions related to the STEM (Science, Technology, Engineering, and Mathematics) Action Center.

Highlighted Provisions:

This bill:

⇒ defines terms;

⇒ modifies:

- the membership and duties of the STEM Action Center Board;
- the duties of the director of the STEM Action Center; and
- the rulemaking authority of the State Board of Education related to the award of STEM education endorsement incentives;

⇒ adds Utah State University Eastern to the list of educational institutions that may partner with a school district or charter school to provide a STEM related certification program; and

⇒ makes technical changes.

Money Appropriated in this Bill:

None

Other Special Clauses:

None

Utah Code Sections Affected:

AMENDS:

63N-12-203, as renumbered and amended by Laws of Utah 2015, Chapter 283

63N-12-204, as renumbered and amended by Laws of Utah 2015, Chapter 283

63N-12-205, as renumbered and amended by Laws of Utah 2015, Chapter 283

63N-12-209, as last amended by Laws of Utah 2015, Chapter 258 and renumbered and amended by Laws of Utah 2015, Chapter 283

63N-12-210, as renumbered and amended by Laws of Utah 2015, Chapter 283

63N-12-212, as renumbered and amended by Laws of Utah 2015, Chapter 283

Be it enacted by the Legislature of the state of Utah:

Section 1. Section **63N-12-203** is amended to read:

63N-12-203. STEM Action Center Board creation — Membership.

(1) There is created the STEM Action Center Board within the office, composed of the following members:

(a) six private sector members who represent business, appointed by the governor;

(b) the state superintendent of public instruction or the state superintendent of public instruction's designee;

(c) the commissioner of higher education or the commissioner of higher education's designee;

(d) one member appointed by the governor;

(e) a member of the State Board of Education, chosen by the chair of the State Board of Education;

(f) the executive director of the office or the executive director's designee;

(g) the president of the Utah College of Applied Technology or the president of the Utah College of Applied Technology's designee; ~~and~~

(h) the executive director of the Department of Workforce Services or the executive director of the Department of Workforce Services' designee; and

~~[(h)]~~ (i) one member who has a degree in engineering and experience working in a government military installation, appointed by the governor.

(2) (a) The private sector members appointed by the governor in Subsection (1)(a) shall represent a business or trade association whose primary focus is science, technology, or engineering.

(b) Except as required by Subsection (2)(c), members appointed by the governor shall be appointed to four-year terms.

(c) The length of terms of the members shall be staggered so that approximately half of the committee is appointed every two years.

(d) The members may not serve more than two full consecutive terms except where the governor determines that an additional term is in the best interest of the state.

(e) When a vacancy occurs in the membership for any reason, the replacement shall be appointed for the unexpired term.

(3) Attendance of a simple majority of the members constitutes a quorum for the transaction of official committee business.

(4) Formal action by the committee requires a majority vote of a quorum.

(5) A member may not receive compensation or benefits for the member's service, but may receive per diem and travel expenses in accordance with:

(a) Section 63A-3-106;

(b) Section 63A-3-107; and

(c) rules made by the Division of Finance under Sections 63A-3-106 and 63A-3-107.

(6) The governor shall select the chair of the board to serve a ~~[one-year]~~ two-year term.

(7) The executive director of the office or the executive director's designee shall serve as the vice chair of the board.

Section 2. Section **63N-12-204** is amended to read:

63N-12-204. STEM Action Center Board — Duties.

(1) The board shall:

(a) establish a STEM Action Center to:

(i) coordinate STEM activities in the state among the following stakeholders:

(A) the State Board of Education;

(B) school districts and charter schools;

(C) the State Board of Regents;

(D) institutions of higher education;

(E) parents of home-schooled students; ~~and~~

(F) other state agencies; and

(G) business and industry representatives;

(ii) align public education STEM activities with higher education STEM activities; and

(iii) create and coordinate best practices among public education and higher education;

(b) with the consent of the Senate, appoint a director to oversee the administration of the STEM Action Center;

(c) select a physical location for the STEM Action Center;

(d) strategically engage industry and business entities to cooperate with the board:

(i) to support high quality professional development and provide other assistance for educators and students; and

(ii) to provide private funding and support for the STEM Action Center;

(e) give direction to the STEM Action Center and the providers selected through a request for proposals process pursuant to this part; and

(f) work to meet the following expectations:

- (i) that at least 50 educators are implementing best practice learning tools in classrooms ~~[per each product specialist or manager working with the STEM Action Center];~~
- (ii) performance change in student achievement in each classroom ~~[working with]~~ participating in a STEM Action Center ~~[product specialist or manager]~~ project; and
- (iii) that students from at least 50 ~~[high]~~ in the state schools participate in the STEM competitions, fairs, and camps described in Subsection 63N-12-205(2)(d).

(2) The board may:

- (a) enter into contracts for the purposes of this part;
- (b) apply for, receive, and disburse funds, contributions, or grants from any source for the purposes set forth in this part;
- (c) employ, compensate, and prescribe the duties and powers of individuals necessary to execute the duties and powers of the board;
- (d) prescribe the duties and powers of the STEM Action Center providers; and
- (e) in accordance with Title 63 G, Chapter 3, Utah Administrative Rulemaking Act, make rules to administer this part.

(3) The board may establish a foundation to assist in:

- (a) the development and implementation of the programs authorized under this part to promote STEM education; and
- (b) implementation of other STEM education objectives described in this part.

(4) A foundation established by the board under Subsection (3):

- (a) may solicit and receive contributions from a private organization for STEM education objectives described in this part;
- (b) shall comply with Title 51, Chapter 7, State Money Management Act;
- (c) does not have power or authority to incur contractual obligations or liabilities that constitute a claim against public funds;
- (d) may not exercise executive or administrative authority over the programs or other activities described in this part, except to the extent specifically authorized by the board;
- (e) shall provide the board with information detailing transactions and balances of funds managed for the board; and
- (f) may not:
 - (i) engage in lobbying activities;
 - (ii) attempt to influence legislation; or
 - (iii) participate in any campaign activity for or against:
 - (A) a political candidate; or
 - (B) an initiative, referendum, proposed constitutional amendment, bond, or any other ballot proposition submitted to the voters.

(5) Money donated to a foundation established under Subsection (3) maybe accounted for in an expendable special revenue fund.

Section 3, Section **63N-12-205** is amended to read:

63N-12-205. STEM Action Center.

- (1) As funding allows, the board shall:
 - (a) establish a STEM Action Center;
 - (b) ensure that the STEM Action Center:
 - (i) is accessible by the public; and
 - (ii) includes the components described in Subsection (2);
 - (c) work cooperatively with the State Board of Education to:
 - (i) further STEM education; and
 - (ii) ensure best practices are implemented as described in Sections 63N-12-206 and 63N-12-207; ~~[and]~~
 - (d) engage private entities to provide financial support or employee time for STEM activities in schools in addition to what is currently provided by private entities~~[-]; and~~

154 (e) work cooperatively with stakeholders to support and promote activities that align
 155 STEM education and training activities with the employment needs of business and industry in
 156 the state.

157 (2) As funding allows, the director of the STEM Action Center shall:

158 (a) support high quality professional development for educators regarding STEM
 159 education;

160 (b) ensure that the STEM Action Center acts as a research and development center for
 161 STEM education through a request for proposals process described in Section 63N-12-206;

162 (c) review and acquire STEM education related materials and products for:

163 (i) high quality professional development;

164 (ii) assessment, data collection, analysis, and reporting; and

165 (iii) public school instruction;

166 (d) facilitate participation in interscholastic STEM related competitions, fairs, camps,
 167 and STEM education activities;

168 (e) engage private industry in the development and maintenance of the STEM Action
 169 Center and STEM Action Center projects;

170 (f) use resources to bring the latest STEM education learning tools into public
 171 education classrooms;

172 (g) identify at least 10 best practice innovations used in Utah that have resulted in [at
 173 least 80% of students performing at grade level] a measurable improvement in student
 174 performance or outcomes in STEM areas;

175 (h) identify best practices being used outside the state and, as appropriate, develop and
 176 implement selected practices through a pilot program;

177 (i) identify:

178 (i) learning tools for kindergarten through grade 6 identified as best practices; and

179 (ii) learning tools for grades 7 through 12 identified as best practices;

180 (j) [provide a] collect data on Utah best practices [database], including best practices
 181 from public education, higher education, the Utah Education and Telehealth Network, and
 182 other STEM related entities;

183 (k) keep track of the following items related to [the] best practices [database] described
 184 in Subsection (2)(j):

185 (i) how the best practices [database is] data are being used; and

186 (ii) how many individuals are using the [database] data, including the demographics of
 187 the users, if available;

188 (l) as appropriate, join and participate in a national STEM network;

189 [~~(m) identify performance changes linked to use of the best practices database~~
 190 ~~described in Subsection (2)(j);~~]

191 [~~(n)~~] (m) work cooperatively with the State Board of Education to designate schools as
 192 STEM schools, where the schools have agreed to adopt a plan of STEM implementation in
 193 alignment with criteria set by the State Board of Education and the board;

194 [~~(o)~~] (n) support best methods of high quality professional development for STEM
 195 education in kindergarten through grade 12, including methods of high quality professional
 196 development that reduce cost and increase effectiveness, to help educators learn how to most
 197 effectively implement best practice learning tools in classrooms;

198 [~~(p)~~] (o) recognize [a high school's] achievement in the STEM competitions, fairs, and
 199 camps described in Subsection (2)(d);

200 [~~(q)~~] (p) send student results from STEM competitions, fairs, and camps described in
 201 Subsection (2)(d) to media and ask the media to report on them;

202 [~~(r)~~] (q) develop and distribute STEM information to parents of students [being served
 203 by the STEM Action Center] in the state;

204 [~~(s)~~] (r) support targeted high quality professional development for improved
 205 instruction in STEM education, including:

(i) improved instructional materials that are dynamic and engaging for students;
(ii) use of applied instruction; and
(iii) introduction of other research-based methods that support student achievement in STEM areas; and

~~[(t)]~~ (s) ensure that an online college readiness assessment tool be accessible by:

(i) public education students; and

(ii) higher education students.

(3) The board may prescribe other duties for the STEM Action Center in addition to the responsibilities described in this section.

(4) (a) The director shall work with an independent evaluator to track and compare the student performance of students participating in a STEM Action Center program to all other similarly situated students in the state, if appropriate, in the following ~~[STEM-related]~~ activities~~[-, at the beginning and end of each year]:~~

(i) public education high school graduation rates;

(ii) the number of students taking a remedial mathematics course at an institution of higher education described in Section 53B-2-101;

(iii) the number of students who graduate from a Utah public school and begin a postsecondary education program; and

(iv) the number of students, as compared to all similarly situated students, who are performing at grade level in STEM classes.

(b) The State Board of Education and the State Board of Regents shall provide information to the board to assist the board in complying with the requirements of Subsection (4)(a) if allowed under federal law.

Section 4. Section **63N-12-209** is amended to read:

63N-12-209. STEM education endorsements and incentive program.

(1) The State Board of Education shall collaborate with the STEM Action Center to:

(a) develop STEM education endorsements; and

(b) create and implement financial incentives for:

(i) an educator to earn an elementary or secondary STEM education endorsement described in Subsection (1)(a); and

(ii) a school district or a charter school to have STEM endorsed educators on staff.

(2) In accordance with Title 63 G, Chapter 3, Utah Administrative Rulemaking Act, the State Board of Education shall make rules ~~[to establish how a]~~ establishing the uses of STEM education ~~[endorsement]~~ endorsements described in Subsection (1) ~~[will be valued on a salary scale for educators.], including that:~~

(a) an incentive for an educator to take a course leading to a STEM education endorsement may only be given for a course that carries higher-education credit; and

(b) a school district or a charter school may consider a STEM education endorsement as part of an educator's salary schedule.

Section 5. Section **63N-12-210** is amended to read:

63N-12-210. Acquisition of STEM education high quality professional development.

(1) The STEM Action Center shall, through a request for proposals process, select technology providers for the purpose of providing a STEM education high quality professional development application.

(2) The high quality professional development application described in Subsection (1) shall:

(a) allow the State Board of Education, a school district, or a school to define the application's input and track results of the high quality professional development;

(b) allow educators to access automatic tools, resources, and strategies, including instructional materials with integrated STEM content;

(c) allow educators to work in online learning communities, including giving and

258 receiving feedback via uploaded video;
 259 (d) track and report data on the usage of the components of the application's system
 260 and the relationship to improvement in classroom instruction;
 261 (e) include video examples of highly effective STEM education teaching that:
 262 (i) cover across section of grade levels and subjects;
 263 (ii) under the direction of the State Board of Education, include videos of highly
 264 effective Utah STEM educators; and
 265 (iii) contain tools to help educators implement what they have learned; and
 266 (f) allow for additional STEM education video content to be added.
 267 (3) In addition to the high quality professional development application described in
 268 Subsections (1) and (2), the STEM Action Center may create STEM education hybrid or
 269 blended high quality professional development that allows for face-to-face applied learning.
 270 Section 6. Section **63N-12-212** is amended to read:
 271 **63N-12-212. High school STEM education initiative.**
 272 (1) Subject to legislative appropriations, after consulting with State Board of Education
 273 staff, the STEM Action Center shall award grants to school districts and charter schools to fund
 274 STEM related certification for high school students.
 275 (2) (a) A school district or charter school may apply for a grant from the STEM Action
 276 Center, through a competitive process, to fund the school district's or charter school's STEM
 277 related certification training program.
 278 (b) A school district's or charter school's STEM related certification training program
 279 shall:
 280 (i) prepare high school students to be job ready for available STEM related positions of
 281 employment; and
 282 (ii) when a student completes the program, result in the student gaining ~~[a nationally]~~
 283 an industry-recognized employer STEM related certification.
 284 (3) A school district or charter school may partner with one or more of the following to
 285 provide a STEM related certification program:
 286 (a) a Utah College of Applied Technology college campus;
 287 (b) Salt Lake Community College;
 288 (c) Snow College; ~~[or]~~
 289 (d) Utah State University Eastern; or
 290 ~~[(d)]~~ (e) a private sector employer.

**EDUCATION COMPUTING PARTNERSHIPS
2017 GENERAL SESSION
STATE OF UTAH**

**Chief Sponsor: Ralph Okerlund
House Sponsor: Bradley G. Last
Cosponsor: Howard A. Stephenson**

LONG TITLE

General Description:

This bill creates the Computing Partnerships Grants program.

Highlighted Provisions:

This bill:

< creates the Computing Partnerships Grants program, administered by the STEM Action Center;

< authorizes the STEM Action Center to work with the State Board of Education to: adopt rules for the administration of the grant program;

establish a grant application process; and

establish a review committee; and

< requires the STEM Action Center to annually report on the grant program to the Education Interim Committee.

Money Appropriated in this Bill:

None

Other Special Clauses:

None

Utah Code Sections Affected:

AMENDS:

63N-12-202, as renumbered and amended by Laws of Utah 2015, Chapter 283

ENACTS:

63N-12-214, Utah Code Annotated 1953

Be it enacted by the Legislature of the state of Utah:

Section 1. Section 63N-12-202 is amended to read:

63N-12-202. Definitions.

As used in this part:

(1) "Board" means the STEM Action Center Board created in Section 63N-12-203.

(2) "Computing partnerships" means a set of skills, knowledge, and aptitudes used in computer science, information technology, or computer engineering courses and career options.

[(2)] (3) "Educator" [has the same meaning as] means the same as that term is defined in Section 53A-6-103.

(4) "Grant program" means the Computing Partnerships Grants program created in this part.

[(3)] (5) "High quality professional development" means professional development that high quality standards developed by the State Board of Education.

(6) "Institution of higher education" means an institution listed in Section 53B-1-102.

(7) "K-16" means kindergarten through grade 12 and post-secondary education programs.

[(4)] (8) "Office" means the Governor's Office of Economic Development.

[(5)] (9) "Provider" means a provider, selected by staff of the board and staff of the

49 Utah State Board of Education, on behalf of the board:
50 (a) through a request for proposals process; or
51 (b) through a direct award or sole source procurement process for a pilot described in
52 Section 63N-12-206.
53 (10) "Review committee" means the committee established under Section 63N-12-214.
54 (11) "Stacked credentials" means credentials that:
55 (a) an individual can build upon to access an advanced job or higher wage;
56 (b) are part of a career pathway system;
57 (c) provide a pathway culminating in the equivalent of an associate's or bachelor's
58 degree;
59 (d) facilitate multiple exit and entry points; and
60 (e) recognize sub-goals or momentum points.
61 [(6)] (12) "STEM" means science, technology, engineering, and mathematics.
62 [(7)] (13) "STEM Action Center" means the center described in Section 63N-12-205.
63 (14) "Talent Ready Utah" means a partnership between the Governor's Office of
64 Economic Development, the Governor's Education Advisor, the Department of Workforce
65 Services, the Utah State Board of Education, the Utah System of Higher Education,
66 representatives of post-secondary technical education, industry partners, and the Utah STEM
67 Action Center.
68 Section 2. Section 63N-12-214 is enacted to read:
69 63N-12-214. Computing Partnerships Grants program.
70 (1) There is created the Computing Partnerships Grants program consisting of the
71 grants created in this part to provide for the design and implementation of a comprehensive
72 K-16 computing partnerships program, based upon the following common elements:
73 (a) outreach and student engagement;
74 (b) courses and content;
75 (c) instruction and instructional support;
76 (d) work-based learning opportunities;
77 (e) student retention;
78 (f) industry engagement;
79 (g) stacked credentials that allow for multiple exit and entry points;
80 (h) competency-based learning strategies; and
81 (i) secondary and post-secondary collaborations.
82 (2) The grant program shall incentivize public schools and school districts to work
83 with the STEM Action Center, staff of the State Board of Education, Talent Ready Utah,
84 industry representatives, and secondary partners on the design and implementation of
85 comprehensive K-16 computing partnerships through:
86 (a) leveraging existing resources for content, professional learning, and instruction,
87 including existing career and technical education funds, programs, and initiatives;
88 (b) allowing for the support of professional learning for pre- and in-service educators;
89 (c) supporting activities that promote and enhance access, diversity, and equity;
90 (d) supporting collaborations and partnerships between K-12, institutions of higher
91 education, cultural and community partners, and industry representatives;
92 (e) identifying the appropriate credentials that align with industry needs and providing
93 the credentials in a stacked credentials pathway;
94 (f) implementing a collaborative network that enables sharing and identification of best
95 practices; and
96 (g) providing infrastructure assistance that allows for the support of new courses and
97 the expansion of capacity for existing courses.
98 (3) The grant program shall include the following:
99 (a) rigorous and relevant metrics that are shared by all grant participants; and
100 (b) an evaluation by the STEM Action Center of the grant program that identifies best

practices.

(4) The STEM Action Center, in consultation with the State Board of Education, shall:

(a) in accordance with Title 63G, Chapter 3, Utah Administrative Rulemaking Act, adopt rules:

(i) for the administration of the grant program and awarding of grants; and

(ii) that define outcome-based measures appropriate to the type of grant awarded under this part;

(b) establish a grant application process;

(c) in accordance with Subsection (5), establish a review committee to make recommendations for:

(i) metrics to analyze the quality of a grant application;

(ii) approval of a grant application; and

(iii) criteria to establish a requirement for an applicant to demonstrate financial need;

and

(d) with input from the review committee, adopt metrics to analyze the quality of a grant application.

(5) (a) The review committee shall consist of K-16 educators, staff of the State Board of Education, representatives of Talent Ready Utah, post-secondary partners, and industry representatives.

(b) The review committee shall:

(i) review a grant application submitted;

(ii) make recommendations to a grant applicant to modify the grant application, if necessary; and

(iii) make recommendations regarding the final disposition of an application.

(6) The STEM Action Center shall report annually on the grant program to the State Board of Education and any findings and recommendations on the grant program shall be included in the STEM Action Center annual report to the Education Interim Committee.

HB 426

STEM AMENDMENTS 2017 GENERAL SESSION STATE OF UTAH Chief Sponsor: Val L. Peterson Senate Sponsor: Brian E. Shiozawa

9 This bill modifies provisions related to the STEM Action Center.

Highlighted Provisions:

10 This bill:

11 ⇒ defines terms;

12 ⇒ creates an expendable special revenue fund called the “STEM Action Center
13 Foundation Fund”;

14 ⇒ provides for treating a portion of money in the fund as an endowment fund such that
15 the principal of the fund is not expended;

16 ⇒ modifies provisions related to the STEM Action Center creating a foundation; and

17 ⇒ makes technical changes.

Money Appropriated in this Bill:

18 None

Other Special Clauses:

19 None

Utah Code Sections Affected:

20 AMENDS:

21 63N-12-202, as renumbered and amended by Laws of Utah 2015, Chapter 283

22 63N-12-204, as last amended by Laws of Utah 2016, Chapter 139

23 63N-12-210, as last amended by Laws of Utah 2016, Chapter 139

24 ENACTS:

25 63N-12-204.5, Utah Code Annotated 1953

26 *Be it enacted by the Legislature of the state of Utah:*

27 Section 1. Section **63N-12-202** is amended to read:

63N-12-202. Definitions.

28 As used in this part:

29 (1) “Board” means the STEM Action Center Board created in Section 63N-12-203.

30 (2) “Director” means the director appointed by the board to oversee the administration
31 of the STEM Action Center.

32 [(2)] (3) “Educator” [has the same meaning as] means the same as that term is defined
33 in Section 53A-6-103.

34 (4) “Foundation” means a foundation established as described in Subsections
35 63N-12-204(3) and (4).

36 (5) “Fund” means the STEM Action Center Foundation Fund created in Section
37 63N-12-204.5.

38 [(3)] (6) “High quality professional development” means professional development that
39 meets high quality standards developed by the State Board of Education.

40 [(4)] (7) “Office” means the Governor’s Office of Economic Development.

41 [(5)] (8) “Provider” means a provider[,] selected [by staff of the board and staff of the
42 Utah State Board of Education, on behalf of the board] on behalf of the board by the staff of the
43 board and the staff of the State Board of Education:

44 (a) through a request for proposals process; or

(b) through a direct award or sole source procurement process for a pilot described in Section 63N-12-206.

~~[(6)]~~ (9) "STEM" means science, technology, engineering, and mathematics.

~~[(7)]~~ (10) "STEM Action Center" means the center described in Section 63N-12-205.

Section 2. Section **63N-12-204** is amended to read:

63N-12-204. STEM Action Center Board — Duties.

(1) The board shall:

(a) establish a STEM Action Center to:

(i) coordinate STEM activities in the state among the following stakeholders:

(A) the State Board of Education;

(B) school districts and charter schools;

(C) the State Board of Regents;

(D) institutions of higher education;

(E) parents of home-schooled students;

(F) other state agencies; and

(G) business and industry representatives;

(ii) align public education STEM activities with higher education STEM activities; and

(iii) create and coordinate best practices among public education and higher education;

(b) with the consent of the Senate, appoint a director to oversee the administration of the STEM Action Center;

(c) select a physical location for the STEM Action Center;

(d) strategically engage industry and business entities to cooperate with the board:

(i) to support high quality professional development and provide other assistance for educators and students; and

(ii) to provide private funding and support for the STEM Action Center;

(e) give direction to the STEM Action Center and the providers selected through a request for proposals process pursuant to this part; and

(f) work to meet the following expectations:

(i) that at least 50 educators are implementing best practice learning tools in classrooms;

(ii) performance change in student achievement in each classroom participating in a STEM Action Center project; and

(iii) that students from at least 50 schools in the state participate in the STEM competitions, fairs, and camps described in Subsection 63N-12-205(2)(d).

(2) The board may:

(a) enter into contracts for the purposes of this part;

(b) apply for, receive, and disburse funds, contributions, or grants from any source for the purposes set forth in this part;

(c) employ, compensate, and prescribe the duties and powers of individuals necessary to execute the duties and powers of the board;

(d) prescribe the duties and powers of the STEM Action Center providers; and

(e) in accordance with Title 63G, Chapter 3, Utah Administrative Rulemaking Act, make rules to administer this part.

(3) The board may establish a foundation to assist in:

(a) the development and implementation of the programs authorized under this part to promote STEM education; and

(b) implementation of other STEM education objectives described in this part.

(4) A foundation established by the board under Subsection (3):

(a) may solicit and receive contributions from a private organization for STEM education objectives described in this part;

(b) shall comply with ~~[Title 51, Chapter 7, State Money Management Act]~~ the requirements described in Section 63N-12-204.5;

(c) does not have power or authority to incur contractual obligations or liabilities that constitute a claim against public funds;

(d) may not exercise executive or administrative authority over the programs or other activities described in this part, except to the extent specifically authorized by the board;

(e) shall provide the board with information detailing transactions and balances ~~[of funds managed for the board]~~ associated with the foundation; and

(f) may not:

- (i) engage in lobbying activities;
- (ii) attempt to influence legislation; or
- (iii) participate in any campaign activity for or against:
 - (A) a political candidate; or
 - (B) an initiative, referendum, proposed constitutional amendment, bond, or any other ballot proposition submitted to the voters.

~~[(5) Money donated to a foundation established under Subsection (3) may be accounted for in an expendable special revenue fund.]~~

Section 3. Section **63N-12-204.5** is enacted to read:

63N-12-204.5. STEM Action Center Foundation Fund.

(1) There is created an expendable special revenue fund known as the “STEM Action Center Foundation Fund.”

(2) The director shall administer the fund under the direction of the board.

(3) Money may be deposited into the fund from a variety of sources, including transfers, grants, private foundations, individual donors, gifts, bequests, legislative appropriations, and money made available from any other source.

(4) Money collected by a foundation described in Subsections 63N-12-204(3) and (4) shall be deposited into the fund.

(5) Any portion of the fund may be treated as an endowment fund such that the principal of that portion of the fund is held in perpetuity on behalf of the STEM Action Center.

(6) The state treasurer shall invest the money in the fund according to the procedures and requirements of Title 51, Chapter 7, State Money Management Act, except that all interest or other earnings derived from those investments shall be deposited into the fund.

(7) The director, under the direction of the board, may expend money from the fund for the purposes described in this part.

Section 4. Section **63N-12-210** is amended to read:

63N-12-210. Acquisition of STEM education high quality professional development.

(1) The STEM Action Center ~~[shall]~~ may, through a request for proposals process, select technology providers for the purpose of providing a STEM education high quality professional development application.

(2) The high quality professional development application described in Subsection (1) shall:

- (a) allow the State Board of Education, a school district, or a school to define the application’s input and track results of the high quality professional development;
- (b) allow educators to access automatic tools, resources, and strategies , including instructional materials with integrated STEM content ;
- (c) allow educators to work in online learning communities, including giving and receiving feedback via uploaded video;
- (d) track and report data on the usage of the components of the application’s system and the relationship to improvement in classroom instruction;

(e) include video examples of highly effective STEM education teaching that:
(i) cover a cross section of grade levels and subjects;
(ii) under the direction of the State Board of Education, include videos of highly effective Utah STEM educators; and
(iii) contain tools to help educators implement what they have learned; and
(f) allow for additional STEM education video content to be added.
(3) In addition to the high quality professional development application described in Subsections (1) and (2), the STEM Action Center may create STEM education hybrid or blended high quality professional development that allows for face-to-face applied learning.

APPENDIX I: LESSONS LEARNED DIGITAL MATH

Observations --Year 2 (2015-2016)	Observations - - Year 3 (2016-2017)	Operational changes	Potential process or contractual changes
<p>(1) Application Detail: As we met with teachers and administrators in Year 2, it became clear that usage expectations and other grant expectations needed to be communicated more clearly in the application. (2) Oversight: In Year 2, we also learned that teachers and administrators did not always know exactly who to contact to receive support or get their questions answered.</p>	<p>Award notifications should be made earlier: In Year 3, we also realized that teachers and administrators plan budgets and curriculum for the following year late in the spring. If they do not know how many licenses they will receive, it makes strategic implementation of personalized learning technology much more difficult.</p>	<p>Changes for Year 3 (Based upon Year 2 observations): (1) Application Detail: To mitigate some of the challenges teachers had in Year 2, the Year 3 applications included more detail regarding all grant expectations, and a link to a concise list detailing all grant requirements was emailed to all participants. District and school level administrators were required to sign a form detailing all grant expectations. (2) Oversight: Participants also received a list providing contact information for representatives from each product provider, and the contact information of an employee at the STEM Action Center. In addition, emails were sent out to all participants early in October to ensure everyone was receiving the support they needed. Changes for Year 4 (based upon Year 3 observations): Earlier Awards: Applications opened early in the spring, and awards notifications were sent out in April.</p>	<p>If the STEM Action Center were to enter into a lengthy contract for a software product it could preclude a district or school from the opportunity to integrate new and or improved products. One recommendation is to pursue a three year R&D cycle where products are selected, with district involvement, through an RFP process. The products would be piloted at small scale while being evaluated for the first year, and then scaled up for two years of implementation to understand impact. In addition, few students will want to use the same program for multiple years, because they may get tired of the interface or other design features (possible "product fatigue"). Therefore, we could use an approach that allows local decision-making and the option of different product selection for different grades, every few years, to maximize the benefit from education technology.</p>
<p>The STEM AC notifies district math coordinators and ALL principals and teacher contacts regarding requirements of the grant. It became clear that greater oversight by the STEM AC was necessary in order to ensure that effective communication could support successful implementation. In the Year 2 evaluation some products had a relatively small sample size because schools did not submit SSIDs in the correct format.</p>	<p>We need better school level contact information: As we sent out program updates, training notices, and other important information in Year 3, it became clear that in several cases the contact information we had for school level contacts was incorrect or incomplete.</p>	<p>Changes in year 3 (based upon Year 2 observations): In Year 3, the STEM Action Center regularly sent notifications to administrators detailing what usage data looked like at each of their schools. Based on preliminary data from our evaluation team, this had very strong positive effects on product usage. In year three we also clearly communicated that only schools who had submitted SSIDs and fulfilled all other data reporting requirements would be eligible for awards in year four. Changes in Year 4 (based upon Year 3 observations): Contact Information: Applications were moved from the district level to the school level in order to secure more accurate school level contact information. The STEM AC team is spending more time in direct communication with educators and principals to identify additional professional learning support that can be provided. One action that will be taken, based upon educator input, is to create a library of documents and videos that highlight best practices for the integration of the digital learning tools into every day instruction.</p>	<p>One of the issues noted by teachers in their end of year survey (from both years) was the lack of access to computers as the largest constraint to implementation. This was a direct result and the reason why we required the principal to commit and ensure students have access to technology for at least 45 minutes. This is also why we required the IT Director's signature to ensure they were aware of the principal's commitment. We cannot use STEM AC funds for the purchase of devices but we are working with industry partners to secure funding for computers or donations of high quality machines.</p>
<p>In Year 2 80% of license issued were used. However, only 37% were used to the level recommended by product providers. Educators indicated that it would useful to them to see how other educators that had higher level of success with adoption and outcomes, were integrating the learning tools into their every day instruction.</p>	<p>60 days into Year 3, any licenses that had not been used were shifted to schools that had used all of their licenses and needed more. Any licenses that were not used by at the end of the year were credited back to the STEM Action Center. In this way, we ensured that 100% of license paid for were used. While in prior years, there has been a focus on fidelity, this year our evaluation team is digging deeper into the data to understand how various usage levels relate to student achievement. This will allow us to make better recommendations to educators, and it will allow us to better understand how products are performing relative to other products.</p>	<p>Changes in Year 3 (based upon Year 2 observations): The STEM AC was faced with the inability to fulfill all licenses requests from LEAs. The STEM AC prioritized requests for licenses to those schools that had usage from Year 2. Changes in Year 4 (based upon Year 3 observations): Because funding was limited, and longitudinal data is required to understand the correlations between product use and student achievement, only schools who participated in year 3 were eligible to apply for year 4. Year 4 awards were based on usage, and we anticipate that the data from year 3 and year 4 together will help teachers be more strategic as they strive to facilitate student success.</p>	<p>The STEM AC is working with their third party evaluators to stratify the usage, or adoption, data. In other words, we want to track schools that are within certain benchmarks of the defined fidelity threshold. We know those that are at or above fidelity, but how many are within 5 or 10 minutes of fidelity and how does each usage level relate to student performance? This will allow the Center team to be more targeted with their support.</p>

CURIOSITY UNLEASHED



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